ATKINS

Annex II

Marine Institute Bird Studies

Trawbreaga Bay Special Protection Area (4034)

Appropriate Assessment Report of Aquaculture

May 2016

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Executive Summary

Introduction

Atkins (Ecology) was commissioned by the Marine Institute to provide ornithological services in relation to the appropriate assessment of aquaculture and shellfisheries on coastal Special Protection Areas (SPAs). This report contains the Appropriate Assessment of aquaculture license areas in Trawbreaga Bay as well as any other activities in and around the bay that may be deemed to contribute to an *'in combination'* effect. The activities being assessed are within the Trawbreaga Bay SPA (site code 004034) and this SPA is the primary focus of this assessment.

Methodology

Analysis of the likely impacts of activities covered in this assessment was based on a comparison of spatial overlap between the SCI species distribution and the spatial extent of the activities as well as looking at species occurrence, behaviour and general ecology. These analyses focus on distribution patterns of feeding, or potentially feeding birds, as the main potential impacts will be to the availability and/or quality of feeding habitat; as well as an assessment of potential impacts on roosting birds, where relevant. Access points and shore based activities were also considered.

The distribution of waterbird was initially analysed using data from the Irish Wetland Bird Survey (IWeBS) counts and National Parks and Wildlife Service (NPWS) baseline waterbird survey counts (carried out in 2009/10); however, due to data constraints the main analysis utilised the NPWS low tide count data from 2009/2010. Additional data on spatial distribution of geese in 2007/2008 was supplied by NPWS local office; along with a summary of year's accumulated knowledge of the site's use by geese (Emmett Johnston, Local Conservation Ranger, NPWS).

The methodology used to identify potentially significant impacts is focussed on the Conservation Objectives, and their attributes, that have been defined and described for Trawbreaga Bay SPA. Impacts that will cause displacement of 5% or more of the total SPA population of a non-breeding SCI species (for each site) have been assessed as potentially having a significant negative impact and are examined further in the context of species behaviour; relationship with aquaculture types; population trends etc.

Conservation objectives

The Special Conservation Interests (SCIs) of the Trawbreaga Bay SPA include non-breeding populations of Barnacle Goose and Light-bellied Brent Goose. In addition, both breeding and non-breeding elements of the Chough population are taken as Special Conservation Interests. Specific attributes and targets for the conservation of Barnacle Goose & Light-bellied Brent Goose and Chough are set out in Tables 3.1 and 3.2, respectively. The wetland habitats within Trawbreaga Bay SPA and the waterbirds that utilise this resource are an additional SCI (the wetlands and water birds SCI). The conservation objective for this SCI is to maintain its favourable conservation condition, which is defined by there being no significant decrease in the permanent area occupied by wetland habitats.

As noted, 2 further SPAs are located within 15 km of Trawbreaga Bay SPA; these are Malin Head SPA (004146; 730 m north of Trawbreaga Bay SPA) and Inishtrahull SPA (004100; 11.6 km northeast of Trawbreaga Bay SPA). The Special Conservation Interests (SCI) of the Inishtrahull SPA are non-breeding populations of Barnacle Goose and breeding populations of Shag and Common Gull, while the Special Conservation Interest (SCI) of Malin Head SPA is a breeding population of Corncrake.

A further five Special Protection Areas are located beyond the 15 km search area recommended by guidance, but are included due to potential interchange that may occur between the sites due to the mobile nature of birds. Sites considered were: -

- Lough Foyle (both ROI and NI managed sites) (15.3 km to the southeast of Trawbreaga Bay SPA) (site codes 004087 & UK 9020031, respectively);
- Lough Swilly SPA (004075; 21 km to the southwest of Trawbreaga Bay SPA);
- Horn Head to Fanad Head SPA (004194; 16.8 km west of Trawbreaga Bay SPA);

- Fanad Head SPA (004148; 20.5 km to the west of Trawbreaga Bay SPA); and
- Greers Isle SPA (004082; 24.5 km west of Trawbreaga Bay SPA).

Screening

All of the SCI species for Trawbreaga Bay SPA were carried forward for full Appropriate Assessment. Each site is addressed separately, in Chapters 6.0. The remained sites were addressed as follows: -

- Inishtrahull SPA (004100) – this site is designated for Barnacle Goose, Shag and Common Gull. Barnacle Goose at this site is considered in full in Chapter 6.0. The potential for impacts on Shag and Common Gull were screened out in Chapter 4.0.
- Malin Head SPA (004146) & Fanad Head SPA (004148) are designated for breeding populations of Corncrake; both were screened out in Chapter 4.0.
- The qualifying interests of Greers Isle SPA (004082) are Sandwich Tern, Black-headed Gull and Common Gull. Each was considered in detail in Chapter 4.0 and screened out.
- Lough Foyle (IE004087) & Lough Swilly (004075) are designated for a diverse range of wintering waders and wildfowl as well as breeding Sandwich Tern and Common Tern in the case of Lough Swilly. The former were screened out based on distance, site use etc.; while the potential for impacts on Sandwich Tern and Common Tern was considered in detail in Chapter 4.0 and screened out.
- Horn Head to Fanad Head SPA (004194). As for Inistrahull, Barnacle Goose at this site is considered in full in Chapter 6.0.

This site is also designated for Chough. Horn Head to Fanad Head SPA supports an important population of breeding Chough (22 breeding pairs in 1992; 32 in 2002/03). Chough favour coastal grassland; while we are not aware of any information on interchange of Chough between Trawbreaga and Fanad, as for Trawbreaga no impact from intertidal aquaculture is predicted. Chough at this site was therefore not considered further.

Other SCI species, namely Peregrine and seabirds (i.e. Fulmar, Cormorant, Shag, Kittiwake, Guillemot and Razorbill) were considered in detail in Chapter 4.0 and screened out.

Description of aquaculture activities

Oyster production has been operational in Trawbreaga Bay since the late 1990's. However, licences for aquaculture activities were not issued until early in the 2000's. In 2001, there were 26 licences to farm oysters in Trawbreaga Bay (BIM, 2014). Currently there are 23 valid oyster production licences and a further 44 new applications (Figure 5.1).

Current oyster cultivation within Trawbreaga SPA (and North Inishown Coast 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 North Inishowen Coast SAC when G4 to G8 (6 – 10mm, respectively) oyster seed is brought to the service site either in spring or late summer of each year. Oyster bags vary in mesh size (4mm, 6mm, 9mm and 14 mm) depending on oyster stock grade. For example 6mm seed is put into 4mm mesh bags at a ratio of 1000 to 1500 seed per bag. Both Diploid and Triploid oysters are grown in Trawbreaga Bay. Though the majority of producers are now moving into triploid production of all their stock as it appears to perform well in the area. The oyster seed is bought in from oyster nurseries in France or the UK and include: GrainOcean, France Turbot, Satmar and 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 2.5 to 4 years, where they will have reached 60 or 80 to the kilo. At reaching market size oysters are in bags of about 120. Some farmers also take in half grown oysters and contract grow for local farmers in the area.

There are three main pacific oyster production areas within Trawbreaga Bay; the North and South of the bay, with one producer farming in the West of the bay. 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 North of the Bay, eight of the producers observe one access route from the shore to their farm area, with a maximum of five tractors active in the area at any one time. In the south of the Bay six active producers observe access growing areas using one dedicated access route from the shore. At any one time depending on times of grading and selling stock there can be up to three tractors and trailers operating across the area. In the west of the bay one producer uses a dedicated access route to the farm. This access route is a public road. Access points are illustrated in Figure 5.1. The actual path of proposed access tracks across the foreshore are illustrated in Figure 5.2.

Assessment of aquaculture activities

Chough

Overall, due to the proposed scale of oyster cultivation; the lack of any significant use of intertidal habitat by Chough; and the separation of proposed oyster cultivation from known foraging, roosting or nesting sites it is unlikely that the intertidal oyster would have a negative impact on Chough using Trawbreaga Bay SPA.

Barnacle Geese

In Ireland, Barnacle Geese (from the Greenland breeding population) is mainly recorded along the west and northwest coasts, at sites such as Trawbreaga Bay. In the case of Trawbreaga, the flock would appear to be closely linked with the wider Malin flock and should be considered as a single unit. The population trend for Barnacle Goose was calculated by NPWS using IWeBS data and is based on the change between the baseline period (mean 1995/96 to 1999/00) and recent counts (mean 2007/08 to 2009/10). A mean number of 645 individuals were recorded for the baseline period with a mean number of 1,421 recorded from the recent period. This represents a 120 percent increase in numbers at Trawbreaga Bay. The site conservation condition for Barnacle Goose at Trawbreaga Bay SPA has therefore been assessed as favourable based on the increasing population. Unlike Light-bellied Brent Geese, Barnacle Geese do not feed on intertidal habitats, but favour terrestrial grassland or saltmarsh. Placement of trestles will not therefore result in direct habitat loss. While there is evidence for intertidal roosting, observed flocks have been small and ample alternate intertidal habitat exists to accommodate such day-time roosting. The main potential for conflict is from access points where there may be increased activity close to feeding birds and / or from increased levels of activity on the shoreline; key areas noted include risk of disturbance to Barnacle Geese at Magheranaul / Strath; close to Malin and close to the Glassagh access point. However, the large aquaculture site in this area (T12/492) is intended only as a nursery area for seed oyster; it will only be accessed three times in the year by a maximum of two workers and therefore, based on the level of activity proposed, it does not represent a significant source of disturbance. While the risk of negative impacts is low, development of a clear Code of Practice; close consultation with NPWS and continuation of annual monitoring of Barnacle Geese is recommended to identify and address any disturbance issues that might arise. Any intensification of activity at T12/492 would need to be reconsidered as part of this process.

Light-bellied Brent Geese

The *hrota* population of Light-bellied Brent Geese that over winter in Ireland and breed in the Canadian high Arctic have shown increases in population since the early 1990's (Boland and Crowe, 2012) with a peak population estimate of 39,000 in 2007 (Hall and Colhoun, 2007). The population has been calculated to be increasing at an annual rate of 5.1 percent overall (Boland and Crowe, 2012). The site population trend for Light-bellied Brent Goose at Trawbreaga Bay published by NPWS is calculated using IWeBS data and is based on the change between the baseline period (mean 1995/96 to 1999/00) and recent counts (mean 2007/08 to 2008/09). A mean number of 362 individuals were recorded for the baseline period with a mean number of 366 recorded from the recent period (2-yr mean 2007/2008 – 2008/2009). This represents a 1 percent increase in numbers at Trawbreaga Bay. As a result, the site conservation condition for Light-bellied Brent Goose at Trawbreaga Bay SPA has been assessed as favourable based on the increasing population.

Light-bellied Brent Geese were recorded in all but one subsite (0A441 – Malin) during the NPWS baseline waterbird surveys. Intertidal foraging was recorded them within five subsites overall: 0A438, 0A439, 0A440, 0A442 and 0A443 (NPWS, 2014a). Brent Geese were recorded most frequently in subsite 0A443 (Northwest) with geese present during all low tide counts. In addition this subsite held the highest mean number of Brent Geese across all low tide counts. The other two subsites where Brent Geese were consistently recorded across the low tide counts were 0A439 (Trawbreaga South) and 0A442 (North central); aquaculture sites are already in place in both 0A439 and 0A442. These two subsites also held high peak and mean numbers of Brent Geese.

Proposals for trestles are located in 0A438, 0A439 and 0A442. Looking solely at area of subsites; areas of intertidal habitat / subsite; and area of intertidal habitat under aquaculture there is a potential for displacement of 0.35%, 2.67% and 2.69% in 0A438, 0A439 and 0A442, respectively; a cumulative displacement of 5.1% of birds within the SPA. As noted, impacts that will cause displacement of 5% or more of the total SPA population of a non-breeding SCI species (for each site) have been assessed as potentially having a significant negative impact and require detailed consideration in the context of species behaviour; relationship with aquaculture types; population trends etc. The current and proposed location of trestles with respect to Light-bellied Brent Geese behaviour and feeding ecology is discussed. The favourable conservation status of the species; large area of available suitable habitat; foraging opportunities provided by green algae on trestles and displacement of birds feeding in and around trestles during the course of routine maintenance all combine to determine how Light-bellied Brent Geese would be impacted by oyster cultivation. In reality displacement of birds is therefore likely to be much less than ca. 5% noted. While the risk of negative impacts is low, development of a clear Code of Practice; close consultation with NPWS and continuation of annual monitoring of Light-bellied Brent Geese is recommended to identify and address any disturbance issues that might arise.

Cumulative impacts

This assessment considered the cumulative impacts of the combined effects of the aquaculture and other activities within the SPA, notably seaweed harvesting, a proposed onshore aquaculture shed, residential and recreational developments, hand collection of shellfish, bait digging and effluent discharge.

Concluding Statement

As noted above it is not anticipated that Chough would be impacted by the proposed aquaculture activities. The main disturbance threat to Chough comes from recreational pressures in the dune systems used by Chough and agricultural change affecting favoured feeding habitat.

There is a risk that presence of additional people on the shore either harvesting seaweed or bait digging etc. could increase the level of disturbance on Light-bellied Brent Geese above that arising from aquaculture activities. However, there is insufficient information in the NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with seaweed harvesting. The Light-bellied Brent Geese population is, however, currently in favourable conservation status and as noted management of *Ascophyllum* may in fact provide feeding opportunities for Light-bellied Brent Geese by encouraging the growth of smaller green / purple algae in short-term cycles before *Ascophyllum* regrows and out-competes them (see comments on proposed Code of Practice / monitoring recommendations).

Like Light-bellied Brent Geese, Barnacle Geese are also in favourable conservation status with a growing population in Trawbreaga / Malin. They are most at risk from disturbance / displacement preventing them from using key foraging sites and to a lesser extent intertidal day-time roost sites. Use of access points and shore based activities must be done in a such a way as not to disturb geese; for example the aquaculture sheds proposed for Balleelaghan (Lagg Road) must be adequately screened to prevent displacement of Barnacle Geese feeding in fields to the west of Malin (south of Lagg Road). Given the distance to preferred fields geese are likely to habituate to routine patterns of noise; as they have to day-to-day patterns of road traffic, farmyard and residential noise sources close to preferred fields. That said workers on the shoreline immediately adjoining preferred fields could result in localised displacement in addition to that arising from aquaculture activities. Given the lack of published data on the response of Barnacle Geese to nearby sources of disturbance, and their ability to habituate to same / or not, it is unclear how Barnacle Geese would respond to aquaculture sources of disturbance.Of most concern would be an increase in onshore activities close to favoured areas at Magheranaul / Strath; near Malin and along the approaches to the access point at Glassagh Point.

As noted, there is insufficient information in the Seaweed NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with seaweed harvesting; the BioAtlantis (2014) NIS for 2014 does, however, speak about seasonal restrictions in ecologically sensitive areas which were agreed with NPWS. Given that

hand-harvesting would appear to be year round it is recommended that such restrictions be incorporated into a proposed Code of Practice discussed above in order to avoid impacting key Barnacle Geese sites.

Acknowledgements

We are grateful to William Cormacan and Emmett Johnston, National Parks and Wildlife Service for providing site data and for providing information about activities in Trawbreaga Bay. Information on aquaculture activities was kindly provided by Louise Collins (BIM); while Francis O'Beirn (Marine Institute) provided useful information and answered many queries. We are also grateful to Mike Trewby for information on Chough distribution in Trawbreaga Bay. Olivia Crowe (BirdWatch Ireland) and Lesley Lewis and David Tierney (NPWS) assisted with the provision of bird data; while Robert Wilkes (EPA) was consulted regarding potential *Zostera* occurrence within Trawbreaga Bay.

1. Introduction

1.1 Atkins (Ecology) was commissioned by the Marine Institute to provide ornithological services in relation to the appropriate assessment of aquaculture and shellfisheries on coastal Special Protection Areas (SPAs).

1.2 This report contains the Appropriate Assessment of existing aquaculture license areas in Trawbreaga Bay as well as any other activities in and around the bay that may be deemed to contribute to an '*in combination*' effect. The activities being assessed are within the Trawbreaga Bay SPA (site code 004034) and this SPA is the primary focus of this assessment. There are two other SPAs within 15 km of the proposed aquaculture and shellfishery areas in Trawbreaga Bay; namely Inishtrahull SPA (site code 004100) and Malin Head SPA (site code 004146).

1.3 Additionally, a number of SPAs are located close to the 15 km buffer from Trawbreaga Bay SPA. These include Lough Foyle SPA (site code 004146), Lough Swilly SPA (site code 004146), Horn Head to Fanad Head SPA (site code 004146), Fanad Head (site code 004146) and Greers Isle SPA (site code 004146).

1.4 Furthermore, to assess any potential for transboundary impact, the portion of Lough Swilly designated as an SPA in Northern Ireland is included. Notably the suite of SCI species listed for the Lough Swilly SPA (NI) is different for the SCI species listed for the Lough Swilly SPA (ROI).

1.5 These above SPAs are all considered in this assessment. The boundaries of these SPAs are shown in Figure 1.1 and Figure 1.2.

1.6 This assessment is based on a desktop review of existing information. This included published reports and papers and unpublished data from waterbird surveys. Where relevant, the report identifies information gaps that may affect the reliability of the conclusions of this assessment.

1.7 For the Appropriate Assessment of aquaculture, the data analysis and report writing was done by Paul O'Donoghue and John Deasy.

1.8 Scientific names and British Trust for Ornithology (BTO) species codes of bird species mentioned in the text are listed in Appendix A.

Scope of the assessment

Aquaculture

1.9 The aquaculture activities contained in this assessment are off-bottom culture of Pacific Oysters (*Crassostrea gigas*) using bag and trestles in the intertidal zone (hereafter referred to as intertidal oyster cultivation) at Trawbreaga Bay, Co. Donegal.

Structure of this report

1.10 The structure of the report is as follows: -

- Section 2 describes the methodology used for the assessment.
- Section 3 lists the Special Conservation Interests (SCIs) of the SPAs included in this assessment, and describes the Conservation Objectives, and their attributes and targets, that have been defined for these SCIs.
- Section 4 contains a preliminary screening assessment that screens out SCIs that do not show any significant spatial overlap with the activities being assessed. It also includes a habitat screening that is used to define which of the remaining SCIs are assessed in relation to activities affecting particular habitat zones.
- Section 5 contains a brief description of the proposed aquaculture activity – in this case solely intertidal cultivation of oysters – and a review of potential impacts on the SCIs of the Trawbreaga Bay SPA and other nearby SPAs.
- Sections 6 presents a detailed assessment of the likely impact of intertidal oyster cultivation on the SCIs of the Trawbreaga Bay SPA and other nearby SPAs; presenting in turn a review of the species status; a summary of distribution patterns within Trawbreaga Bay SPA; a summary of the species response to trestles; and an assessment of potential impacts.
- Section 7 contains an assessment of cumulative impacts from the in-combination effects of aquaculture with other relevant activities.
- Section 8 provides a concluding assessment of the impacts of the aquaculture activities included in this assessment, and any in-combination effects with other activities, on the conservation objectives of the SCIs of the Trawbreaga Bay SPA and other nearby SPAs.
- Section 9 – References.

Constraints to this assessment

1.11 The subsites used for waterbird counts in the Trawbreaga Bay SPA do not cover the whole SPA as the boundaries for the SPA have been altered to include additional areas of coastal cliff and grassland to the north around the Five Fingers area primarily to include important habitat for Chough. In any event, all areas where aquaculture activity is proposed to occur are included the count subsites and the areas outside the count subsites but inside the SPA are unlikely to be used by geese.

1.12 There is relatively good information available on the low tide distribution of waterbirds in Trawbreaga Bay in winter through the NPWS BWS counts; IWeBS counts, however, are more limited.

1.13 There is a strong base for the assessment of displacement impacts for some of the aquaculture activities, particularly intertidal oyster cultivation.

1.14 The assessment of cumulative impacts provides a general assessment of issues such as recreational impacts, but without detailed information on other activities it is not possible to precisely quantify these potential impacts. General comments are, however, included as appropriate.

2. Methodology

General

2.1 This assessment is based on a desktop review of existing information about waterbird population trends and distribution in Trawbreaga Bay. Additional waterbird data was provided by Emmett Johnston, NPWS conservation ranger.

Data sources

2.2 The SPA boundaries are derived from NPWS *shapefiles* which were downloaded from the NPWS website. The spatial extents of the proposed aquaculture plots have been derived from shapefiles supplied by the Marine Institute (dated 6/8/2014) based upon site lists supplied to the Marine Institute by the Department of Agriculture, Food and the Marine. An updated list of licences was subsequently forwarded to Atkins on the 26/4/2016. An Aquaculture Profile was provided by Louise Collins (BIM). Spatial mapping of existing aquaculture structures on site was provided by the Engineering section of Department of Agriculture, Food and the Marine (DAFM).

2.3 Subsite count boundaries were provided by Dr. Lesley Lewis (NPWS baseline waterbird survey) and Olivia Crowe, BirdWatch Ireland (IWeBS).

2.4 The waterbird data sources used for the assessment are as follows: -

- Irish Wetland Bird Survey (I-WeBS) counts 1994/95-2013/14;
- NPWS Baseline Waterbird Survey (NPWS BWS) 2009/10 counts;
- NPWS Non-estuarine Waterbird Survey (NPWS NEWS) 1997/98 counts;
- Additional count / spatial data provided by Emmett Johnston, NPWS; and
- Additional sources of published bird data.

2.5 Biotope information for Trawbreaga Bay was collected on two occasions with Aquatic Services Unit performing a survey of the mudflats and sandflats (ASU, 2007) and RPS performing a benthic survey of the intertidal habitat in 2009 and 2010 (RPS, 2013). Furthermore, distribution of biotopes within the Trawbreaga Bay SPA is based upon the NPWS biotope map, from the Site-specific Conservation Objectives datasets downloaded from the NPWS website, Habitats and Species section.[1]

2.6 Information on other activities (such as recreational use and boat activity) was obtained primarily from a review of potentially disturbing activities recorded during the NPWS BWS counts (Cummins and Crowe, 2010) and field observations from Emmett Johnston (NPWS Conservation Ranger for Inishowen).

2.7 GIS data used for this assessment was mainly received in Irish Transverse Mercator (ESPG: 2157) (ITM) coordinate reference system. GIS data received in the Irish National Grid (IG) coordinate reference system was transformed to the ITM coordinate reference system using the method described by Alcorn (2014).Trawbreaga Bay SPA

[1] http://webgis.npws.ie/npwsviewer/ (downloaded 11/05/2015; last updated by NPWS 15/01/2015)

2.8 The boundary of Trawbreaga Bay SPA is presented below (Figure 2.1). The SPA includes a large area of intertidal habitat sheltered within the bay, with some narrow tidal creeks which develop into wider subtidal channels towards the mouth of the bay. Areas of terrestrial habitat, including saltmarsh, coastal beach, dune, grassland, shingle banks and coastal cliffs are included within the boundaries of the SPA. The SPA also includes Glashedy Island and the waters surrounding it, west of Doagh Isle.

2.9 The total area of the SPA is 1,549ha. Around 80 percent of the bay area is exposed at each low tide with the intertidal sediment composed mainly of a mix of mud and sand flats, with some stony/rocky substrates. Green algae mats occur on the open flats and *Fucus* spp. seaweeds grow on the stones. In places the intertidal flats merge with salt marshes, particularly in the west and southeast of the bay. The surrounding land use is mostly low intensity agriculture (NPWS, 2014a).

Ordnance Survey of Ireland Licence No. AR0082514

Figure 2.1 – Boundary of the Special Protection Area in Trawbreaga Bay, Co. Donegal.

Shellfish Waters

2.10 Article 5 of the Shellfish Directive (2006/113/EC) and Section 6 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) require the development of Pollution Reduction Plans (PRPs) for designated shellfish areas in order to support shellfish life and growth and to contribute to the high quality of directly edible shellfish products. Shellfish PRPs relate to bivalve and gastropod molluscs, including oysters, mussels, cockles, scallops and clams. They do not cover shellfish crustaceans such as crabs, crayfish and lobsters. Trawbreaga has been designated for oyster farms and a small amount of clams and mussels. The designated shellfish area in Trawbreaga Bay is 4.3 km^2 and stretches from Moanrealtagh Point to Doaghmore Point and around Fegart Point. The contributing catchment of the shellfish area is 144.4 km^2 in area and includes a number of small rivers and streams, chiefly the Ballyboe, Donagh and Glennagannon Rivers (RPS, 2013).

Other Designations

2.11 Trawbreaga Bay is also part of the North Inishowen Coast proposed Natural Heritage Area / Special Area of Conservation (site code 002012).

2.12 Trawbreaga Bay is also designated as a Ramsar site (site number 841; designated on 11th June 1996). The total area of the site is 1,003.0 ha, much of which overlaps with the boundaries of the SPA. To acquire designation under the Ramsar Convention, the site must contain wetland habitats of international importance. The convention encourages the conservation and sustainable utilisation of wetlands and their resources within these sites.

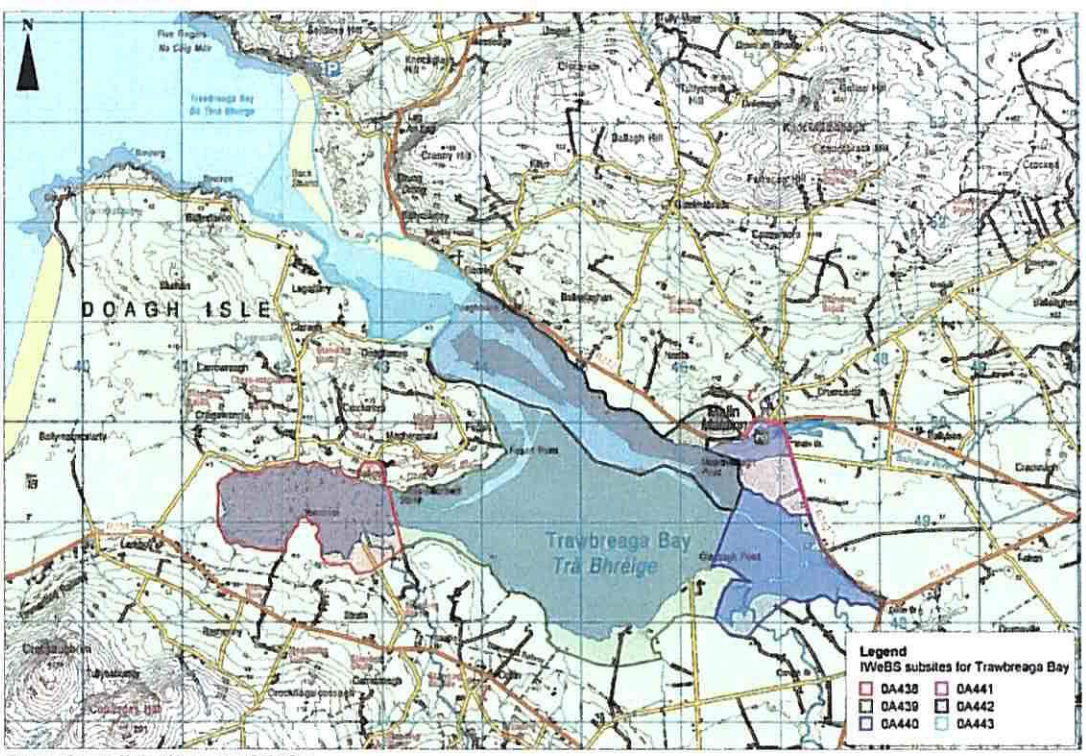
2.13 In addition, Trawbreaga Bay is designated as a Wildfowl Sanctuary under National legislation (WFS-17). This prohibits the hunting of birds within its boundary.

Bird Count Subsites

2.14 Trawbreaga Bay is subdivided into a number of subsites for the purposes of various bird surveys within the SPA boundary. These are discussed below with any variations between the boundaries highlighted.

BWI IWeBS Subsites

2.15 Trawbreaga Bay is divided into 6 subsites for the BirdWatch Ireland IWeBS survey (Figure 2.2). The subsites do not cover the coastal cliff area north of the Back Strand, the coastal dune and grassland habitat behind the Back Strand or Glashedy Island which are within the SPA boundary. However, subsite 0A441 covers an area of grassland habitat west of the R242 road. The subsites along the southern shore of the bay also include areas of grassland that are not within the boundaries of the SPA. Notably, the area of saltmarsh at Ballymacmoriarty which is within the SPA is not covered by the IWeBS count subsites.

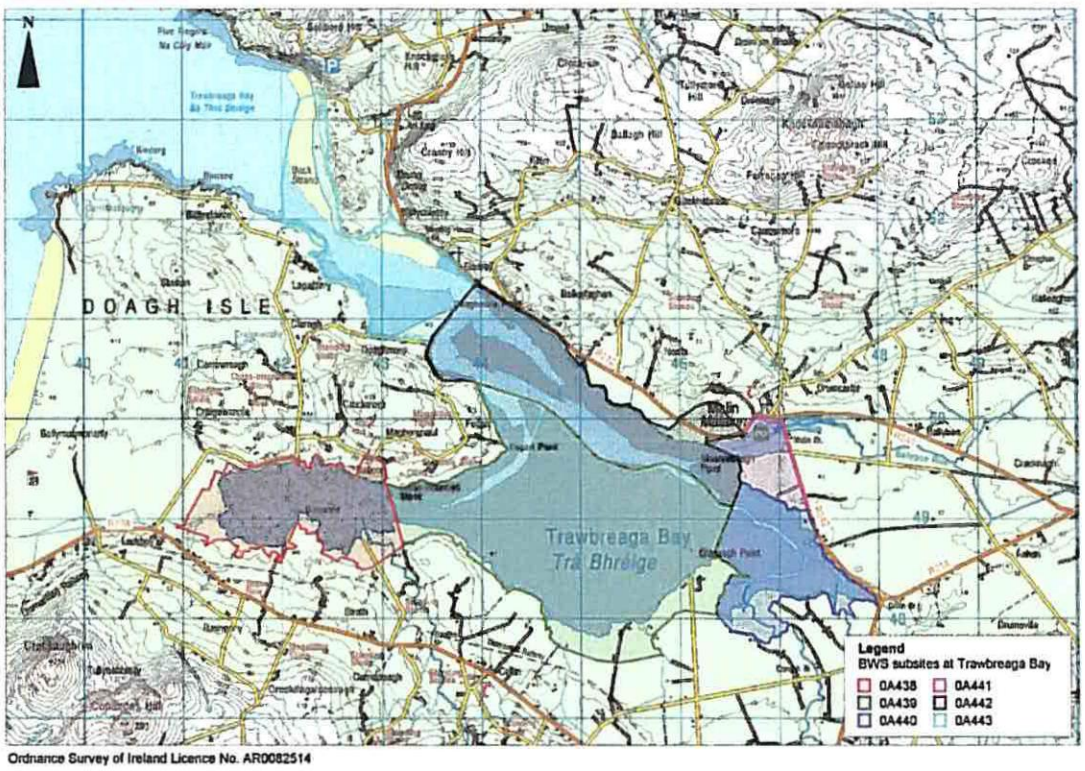


Ordnance Survey of Ireland Licence No. AR0082514

Figure 2.2 – Boundary of area covered by IWeBS high tide counts around Trawbreaga Bay.

NPWS BWS Subsites

2.16 Trawbreaga Bay is also divided into 6 subsites for the NPWS BWS survey (Figure 2.3). The boundaries of the BWS subsites broadly follow those of the IWeBS. However, there are slight differences outlined below.



Ordnance Survey of Ireland Licence No. AR0082514

Figure 2.3 – Boundary of NPWS BWS monitoring subsites around Trawbreaga Bay.

Subsite area variations

2.17 The boundaries of IWeBS and BWS subsites were not equivalent and therefore slight differences in area for each subsite were noted in Trawbreaga Bay, notably the areas of saltmarsh at Ballymacmoriarty in the west and south of Glassagh Point. Other differences between the boundaries include an area of intertidal and subtidal habitat at the mouth of the bay in 0A443 and the boundary at the Back Strand.

2.18 Table 2.1 shows the areas recorded on the GIS attribute tables for both datasets from the *shapefiles* provided from BWI and NPWS, respectively.

Table 2.1 – Variation in subsite areas from IWeBS and BWS subsites inTrawbreaga Bay.

Subsite Code	IWeBS area (ha)	BWS area (ha)
0A438	144.06	167.87
0A439	495.41	496.30
0A440	120.42	129.24
0A441	47.92	44.17
0A442	215.97	222.72
0A443	170.85	176.49
Total area (ha)	**1194.63**	**1236.79**

BWI NEWS Transects

2.19 The BWI non-estuarine waterbirds survey (NEWS) transects located at Trawbreaga Bay are divided into two sections on the north and south coasts at the mouth of the bay. The northern section runs along the top of the cliffs within the boundary of the SPA. The southern section begins within the SPA boundary and runs west along the top of the cliffs, finishing at the northern end of the beach in Pollan Bay (Figure 2.4). These areas lie entirely outside the bay in areas where no aquaculture is proposed. They are therefore not used further in this assessment.

Figure 2.4 – Transects followed by BWI NEWS monitoring counts around Trawbreaga Bay.

Biotopes

2.20 Biotope information for Trawbreaga Bay was collected on two occasions with Aquatic Services Unit performing a survey of the mudflats and sandflats (ASU, 2007) and RPS performing a benthic survey of the intertidal habitat in 2009 and 2010 (RPS, 2013).

2.21 RPS (2013) characterised the outer bay as having long sand strands to the north and south, with exposed rock and shingle areas at the mouth of the estuary. The strands are relatively barren with mobile sands at the low water mark. The outer bay beaches are backed by dunes. These beaches include rock outcrops of mussel and barnacle communities, but these only occur in the outer estuary. Towards the mid channel these beaches have rippled sands with moderate densities of *Arenicola marina* (Lugworm) casts.

2.22 The mid estuary is characterised by muddy sands with some gravels. The upper shore is characterised by gravels and muds with upper shore fucoids such as *Pelvetia canaliculata* and *Fucus spiralis* with some areas of *Ascophyllum nodosum* (RPS, 2013). The sheltered nature of the inner bay along with riverine input results in areas of mudflats. To the south of the inner estuary there is a large muddy sandy area with oyster trestles at the channel (RPS, 2013). The upper estuarine areas in some areas are either low impact coastal defence such as boulders or cobbles. Around the town of Malin there are areas of rock armour and seawall (RPS, 2013).

2.23 While RPS (2013) includes written descriptions and photographs from each sampling station no map of biotope distribution was produced from these surveys.

2.24 Aquaculture sites (licenced and applications) at Trawbreaga Bay relative to principal benthic communities recorded within the marine Annex I qualifying interest of Mudflats and sandflats not covered by seawater at low tide (1140) of North Inishowen Coast SAC (NPWS 2014e) are presented in Figure 2.5 (copy of Figure 5.1 from the North Inishowen Coast SAC appropriate assessment; Marine Institute, 2016).

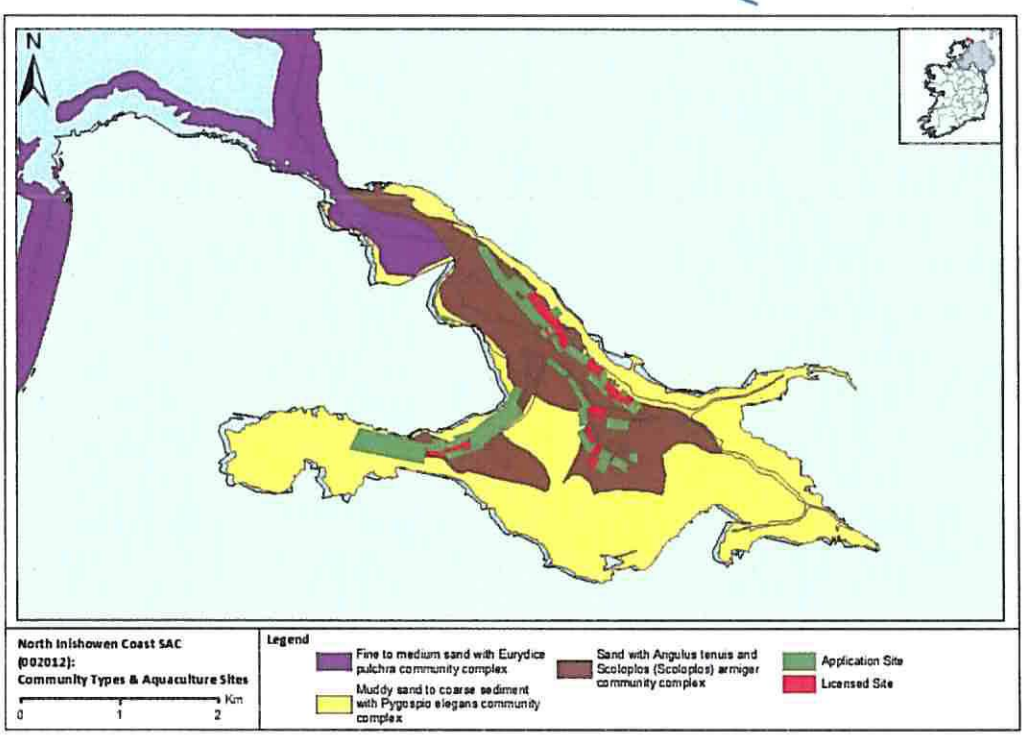


Figure 2.5 – Aquaculture sites (licenced and applications) at Trawbreaga Bay relative to principal benthic (copy of Figure 5.1 from the SAC Assessment.

Analyses of waterbird distribution

2.25 The analyses of waterbird distribution in this assessment focuses on distribution patterns of feeding, or potentially feeding birds, as the main potential impacts will be to the availability and/or quality of feeding habitat. Most waterbird species will roost at high tide in shoreline or terrestrial areas, which will not be affected by the activities being assessed. However, we have included assessment of potential impacts on roosting birds that may roost in subtidal habitats, on intertidal sandflats, or when activities can occur during the high tide period. Consideration has also been given to proposed access routes.

2.26 Waterbird distribution has been mainly analysed by reviewing count data across subsites from the NPWS BWS and/or I-WeBS dataset. However, we have only calculated percentage distributions where we consider the data to be consistent (i.e. excluding counts with poor coverage and/or low numbers). In addition, NPWS BWS flock map data has also been used as well as additional survey and spatial data from Emmett Johnston, NPWS.

Use of data sources

Irish Wetland Bird Survey (I-WeBS)

2.27 The Irish Wetland Bird Survey (IWeBS) scheme aims to carry out monthly counts each winter between September and March in all sites that are important for non-breeding waterbird populations. However, this level of coverage is not always possible to achieve in a volunteer-based scheme and in relatively isolated sites such as Trawbreaga Bay. Count coverage at Trawbreaga Bay are presented in Table 2.2 below.

Table 2.2 – Coverage and percentage of subsites covered by IWeBS counts in Trawbreaga Bay SPA from 1994/95 to 2013/14.

Year	Months	% Complete	Year	Months	% Complete
1994/95	J, F	29	2004/05	No Data	0
1995/96	S,O*^, J, F*	57	2005/06	No Data	0
1996/97	S*^, O, N, D*^, J*, F	86	2006/07	No Data	0
1997/98	O*^, N, D, J, F, M	86	2007/08	D, F^	29
1998/99	N, D, J, M	57	2008/09	S^, N, J	43
1999/00	N, D*^	29	2009/10	O^, N^, J*, F, M	71
2000/01	No Data	0	2010/11	N	14
2001/02	F	14	2011/12	F, M	29
2002/03	J*^, F, M	43	2012/13	N	14
2003/04	No Data	0	2013/14	No Data	0

Notes: -

Results based on IWeBS data returned from BWI from data request.

* Low Accuracy (some or all of count affected).

^ Low Quality (some or all of count affected).

2.28 Prior to the NPWS baseline waterbird survey in 2009/2010 (discussed below) the whole bay at Trawbreaga was counted as one site. Boundaries, approximately following those used during the NPWS baseline waterbird survey, were used in subsequent IWeBS surveys in the bay.

2.29 Table 2.2 demonstrates that recent IWeBS counts were rarely made on more than two months each survey season. The most consistent effort was made during the period around the NPWS baseline waterbird survey. In the intervening years, frequency of counts has been poor with a limited number or no counts undertaken each year. In addition, only poor coverage has been achieved during the counts that have been made at the site.

NPWS Baseline Waterbird Survey

2.30 In the winter of 2009/10 waterbird counts were carried out as part of the National Parks and Wildlife Service's baseline waterbird survey. Details of the NPWS baseline waterbird survey methodology and results at Trawbreaga Bay are described in Cummins and Crowe (2010). A site visit was made on the 16th September 2009 to scope and plan the survey. Six low tide and one high tide count were carried out between the 19th October 2009 and the 12th March 2010. The counts were carried out by a co-ordinated team of three professional counters. Most counts were completed within a 3-hour period.

2.31 The winter of 2009/10 was "*the coldest winter since 1962/63 everywhere*" with "*mean air temperatures for the season around two degrees lower than the 1961-1990 average*" (Met Éireann, 2010). Due to the extreme cold weather in early January, the planned high tide count at Trawbreaga Bay was postponed until the 5th February 2010. In general, each count was completed in a single day with overall good weather conditions reported with fair conditions reported on the 2nd November low tide count due to strong winds and showers which reduced visibility (Cummins and Crowe, 2010).

2.32 The NPWS BWS counted feeding and roosting birds separately. However, we have generally not analysed their distribution separately. In general, birds at low tide usually roost in the same area as they feed and often the roosting birds are mainly just roosting for short periods of time before resuming feeding. Therefore, the division between feeding and roosting may be a matter of chance depending upon the exact timing of the count.

2.33 As part of the NPWS baseline waterbird survey, the approximate position of the main flocks encountered were mapped. There are some limitations to the interpretation of flock map data because of the difficulties of accurately mapping positions of distant flocks from shoreline vantage points and also the two observers may have varied in the extent to which they mapped flocks.

Additional NPWS spatial data (geese)

2.34 Emmett Johnston, NPWS kindly provided additional data on both Barnacle Goose and Light-bellied Brent Goose. In both cases these data included both counts and information on spatial distribution of birds. This was also used in assessing potential impacts on these species.

Aquaculture assessment methodology

General approach

2.35 The methodology used for this Appropriate Assessment is focused on the Conservation Objectives, and their attributes, that have been defined and described for the Special Conservation Interest (SCI) species of the Trawbreaga Bay SPA (NPWS, 2014a).

2.36 The conservation objectives for SCI species defines two types of attributes to assess conservation condition

- long term population trends; and
- distribution of birds which is measured by range, timing and intensity of use of areas within the SPA.

2.37 This assessment focuses on assessing potential impacts on the spatial distribution of the SCI waterbird species within Trawbreaga Bay and, in particular, whether the activities will cause displacement of a significant proportion of the Trawbreaga Bay population from the affected area(s). If the activities are not predicted to cause significant displacement, then the activities are not likely to affect the long term population trends. If the activities are predicted to cause significant displacement, then the activities could affect the long term population trends (but see below). In the cases where the activities are predicted to cause significant displacement, the impacts on distribution and population size are considered separately.

2.38 The basis for the assessments are datasets that indicate the distribution of waterbird species between different broad sectors of Trawbreaga Bay (the I-WeBS and NPWS BWS counts) as well as additional data informed by local knowledge and long term observations by the local NPWS conservation ranger. The datasets allow calculation, or qualitative assessment, of the proportion of the Trawbreaga Bay population that would be affected if aquaculture activities cause displacement of birds from areas occupied by the activities under consideration. This approach can be considered as a very simple form of habitat association model and represents a conservative form of assessment (see Stillman and Goss-Custard, 2010): the population-level consequences of displacement will depend upon the extent to which the remaining habitat is available (i.e., whether the site is at carrying capacity). In general this assessment method "*will be pessimistic because some of the displaced birds will be able to settle elsewhere and survive in good condition*" (Stillman and Goss-Custard, 2010).

2.39 The assessment of potential disturbance impacts is based mainly on the potential for disturbance to cause displacement of birds from areas they would otherwise occupy. However, where there is limited availability of alternative habitat, or where the energetic costs of moving to alternative habitat is high, disturbance may not cause displacement of birds but may still have population-level consequences (e.g., through increased stress, or reduced food intake, leading to reduced fitness) (Gill *et al.*, 2001). However, assessing these types of potential impacts would require detailed population modelling, which would require a major research effort that is beyond the scope of this assessment.

Structure of the assessment

2.40 An initial screening exercise was carried out to screen out SCI species that did not show any potential spatial overlap with effects from any of the proposed activities being assessed. This was undertaken across all SPAs being considered. The conservation status of all the remaining SCIs and their distribution within Trawbreaga Bay was then reviewed. This review included exploratory analyses of the relationships between subsite distribution and various habitat parameters, as well as visual assessment of habitat relationships from the flock map data. The objective was to identify habitat parameters that could be used to interpret species distribution patterns in relation to areas affected by intertidal oyster cultivation.

2.41 The potential impacts of the intertidal oyster cultivation on all the remaining SCI species that cannot be screened out were assessed. As noted, SCI species from other SPAs were included in this assessment, but the assessment was limited to the potential impact on their utilisation of Trawbreaga Bay.

2.42 The in-combination effects of aquaculture with other activities was then assessed. This stage of the assessment was limited to species for which the in-combination effects of all aquaculture activities found relatively high levels of potential displacement. Again the assessment of SCI species from other SPAs was limited to the potential impact on their utilisation of Trawbreaga Bay.

2.43 Finally, the likely impact on the attributes defined in the conservation objectives for each SCI was assessed. For this stage of the assessment, each SCI population was considered separately in relation to the objectives for the relevant SPA.

Identification of potential impacts

2.44 Potential negative impacts to SCI species from habitat alteration have been identified where the activity may cause negative impacts to prey resources, where there is evidence of a negative response to the activity by the species from previous work, and/or where a negative response is considered possible by analogy to activities that have similar types of impacts on habitat structure and/or by analogy to ecologically similar species.

2.45 As well as considering potential disturbance impacts to foraging birds, we also considered potential disturbance impacts to breeding colonies and roost sites, where relevant. Potential negative disturbance impacts were identified when the spatial and temporal intensity of the activity was considered to represent frequent disturbance. Population modelling studies indicate that a high frequency of disturbance (multiple disturbances per hour) are required to cause negative effects to waterbird survival rates (Durell *et al.*, 2007, 2008; Goss-Custard *et al.*, 2006). Therefore, small-scale and/or infrequent disturbance impacts have not been assessed individually for each activity, but are considered as part of the cumulative assessment.

Assessment of impact magnitude

2.46 Where potential impacts from an activity on a SCI species have been identified, or cannot be ruled out, the spatial overlap between the distribution of the species and the spatial extent of the activity was calculated, or qualitatively assessed when quantitative data was not available. This overlap is considered to represent the potential magnitude of the impact, as it represents the maximum potential displacement if the species has a negative response to the activity. Where appropriate, information on species habitat usage was used to refine the assessment of likely impact magnitude.

Trawbreaga Bay non-breeding SCI species

2.47 The normal approach adopted in the detailed assessment methodology is to quantify the potential displacement impacts for the Trawbreaga Bay non-breeding SCI species. In order to complete this assessment, the site would be divided into appropriate tidal zones, such as intertidal, shallow subtidal etc. However, in the case of Barnacle Geese and Chough; both species are largely terrestrial (supratidal) with limited use of intertidal areas. Light-bellied Brent Geese utilise both intertidal and shallow subtidal habitats; with birds on occasion also roosting on deeper subtidal waters.

2.48 The calculated potential displacement assumes that all birds are excluded by the proposed activity and that birds are uniformly distributed throughout the relevant tidal zone(s) within the relevant subsite(s). In the impact assessment section for each activity, after presentation of the calculated potential displacement, these assumptions are discussed, and the nature of any adjustment that should be made to the potential displacement is assessed.

2.49 All of the aquaculture plots are covered by the NPWS baseline waterbird survey or I-WeBS subsites. The ecology of the species and their general distribution patterns in the SPA in relation to biotopes and tidal zones was used to assess their potential occurrence in the affected areas.

Additional SCIs from other SPAs

2.50 SCIs from other neighbouring SPAs were also considered. These include both species which are also an SCI for Trawbreaga Bay; and species for which Trawbreaga Bay is not designated, but which could conceivably occur within the bay.

Assessment of impact significance

2.51 The significance of any potential impacts identified has been assessed with reference to the attributes and targets specified by NPWS for the conservation objective for each SCI. Potential negative impacts are either assessed as significant (if the assessment indicates that they will have a detectable effect on the attributes and targets) or not significant. The significance levels of potential positive impacts have not been assessed.

Trawbreaga Bay non-breeding SCI species

Attribute 1 – Long term population trends

2.52 The criteria that we have used for assessing significance with reference to attribute 1 of the conservation objectives are summarised in Table 2.3 and are described below.

2.53 If the impact is predicted to cause spatial displacement of >25% of the total Trawbreaga Bay population of a SCI species, then the impact could, pessimistically, cause the long term population trend to show a decrease of 25% or more. Therefore, the impact would be potentially significant with reference to attribute 1 of the conservation objective.

2.54 If the long-term population trend of the species is a decrease of 25% or more, and the impact is predicted to cause spatial displacement of 5% or more (see criteria under Attribute 2), then the impact could prevent the potential recovery of the population. Therefore, the impact would be potentially significant with reference to attribute 1 of the conservation objective.

2.55 If the long-term population trend of the species is a decrease of less than 25%, but the combination of the long-term population trend and the predicted spatial displacement (where the latter is assessed to be significant; see criteria under Attribute 2) would equal or exceed 25%, then the impact could cause the long term population trend to show a decrease of 25% or more. Therefore, the impact would be potentially significant with reference to attribute 1 of the conservation objective.

Table 2.3 - Criteria for assessing significance with reference to attribute 1 of the conservation objectives.

Long-term population decrease (P)	Spatial displacement (S)	Additional criteria	Impact
-	≥ 25%	-	Significant
≥ 25%	≥ 5%	-	Significant
< 25%	≥ 5%	P + S ≥ 25%	Significant

Attribute 2 – Number or range (distribution) of areas used

2.56 Assessing significance with reference to attribute 2 is more difficult because the level of decrease in the numbers or range (distribution) of areas that is considered significant has not been specified by NPWS. There are two obvious ways of specifying this threshold: (i) the value above which other studies have shown that habitat loss causes decreases in estuarine waterbird populations; and (ii) the value above which a decrease in the total Trawbreaga Bay population would be detectable against background levels of annual variation.

2.57 There have been some studies that have used individual-based models (IBMs; see Stillman and Goss-Custard, 2010) to model the effect of projected intertidal habitat loss on estuarine waterbird populations. West *et al.* (2007) modelled the effect of percentage of feeding habitat of average quality that could be lost before survivorship was affected. The threshold for the most sensitive species (Black-tailed Godwit) was 40%. Durell *et al.* (2005) found that loss of 20% of mudflat area

had significant effects on Oystercatcher and Dunlin mortality and body condition, but did not affect Curlew. Stillman *et al.* (2005) found that, at mean rates of prey density recorded in the study, loss of up to 50% of the total estuary area had no influence on survival rates of any species apart from Curlew. However, under a worst-case scenario (the minimum of the 99% confidence interval of prey density), habitat loss of 2-8% of the total estuary area reduced survival rates of Grey Plover, Black-tailed Godwit, Bar-tailed Godwit, Redshank and Curlew, but not of Oystercatcher, Ringed Plover, Dunlin and Knot. Therefore, the available literature indicates that generally quite high amounts of habitat loss are required to have significant impacts on estuarine waterbird populations, and that very low levels of displacement are unlikely to cause significant impacts. However, it would be difficult to specify a threshold value from the literature as these are likely to be site specific.

2.58 If a given level of displacement is assumed to cause the same level of population decrease (i.e., all the displaced birds die or leave the site), then displacement will have a negative impact on the conservation condition of the species. However, background levels of annual variation in recorded waterbird numbers are generally high, due to both annual variation in absolute population size and the inherent error rate in counting waterbirds in a large and complex site. Therefore, low levels of population decrease will not be detectable (even with a much higher monitoring intensity than is currently carried out). The minimum error level in large-scale waterbird monitoring is considered to be around 5% (Hale, 1974; Prater, 1979; Rappoldt, 1985). Therefore, any population decrease of less than 5% is unlikely to be detectable and, for the purposes of this assessment, 5% has been taken to be the threshold value below which displacement effects are not considered to be significant. This is a conservative threshold, as error levels combined with natural variation are likely to, in many cases; prevent detectability of higher levels of change. This threshold is also likely to be very conservative in relation to levels that would cause reduced survivorship (see above).

Summary

2.59 Impacts have been assessed as potentially having a significant negative impact on attribute 1 of the conservation objectives (the species' long-term population trend), if they are predicted to cause:

- Displacement of 25% or more of the Trawbreaga Bay total; or
- Significant displacement levels (i.e., 5% or greater) that combined with current long-term population trends, could result in a long-term population decline of 25%; or
- Significant displacement levels (i.e., 5% or greater) where the current long-term population decline is already equal to or greater than 25%.

2.60 Impacts that will cause displacement of 5% or more of the total Trawbreaga Bay population of a SCI species have been assessed as potentially having a significant negative impact on attribute 2 of the conservation objectives (the species' distribution within Trawbreaga Bay).

Other SCIs

2.61 The methodology outlined above was developed with wintering waders and wildfowl in mind. With respect to breeding birds, in many cases detailed attributes and targets have been specified by NPWS for the conservation objective for each species relating to breeding colony size, distribution and productivity, prey resources, barriers to connectivity and disturbance. All the other attributes are assessed qualitatively. The same approach will be adopted for Chough.

3. Conservation Objectives

Trawbreaga Bay SPA (Site code: 004034)

Special Conservation Interests

3.1 The Special Conservation Interests (SCIs) of the Trawbreaga Bay SPA include non-breeding populations of Barnacle Goose and Light-bellied Brent Goose. In addition, both breeding and non-breeding elements of the Chough population are taken as Special Conservation Interests (NPWS, 2004; 2014a; 2014b).

3.2 In addition the wetland habitat within Trawbreaga Bay SPA is an additional Special Conservation Interest.

Conservation objectives

SCI species

3.3 The overall conservation objective for the non-breeding populations of Barnacle Goose and Light-bellied Brent Goose is to maintain or restore the favourable conservation status of the species (NPWS, 2014a).

3.4 The favourable conservation conditions of these non-breeding species in Trawbreaga Bay SPA are defined by various attributes and targets, which are shown in Table 3.1.

Table 3.1 – Attributes and targets for the conservation objectives for non-breeding populations of Barnacle Goose and Brent Goose in Trawbreaga Bay SPA.

Attribute	Measure	Target	Notes
1 Population trend	Percentage trend	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document [NPWS, 2014a].
2 Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by ... [the SIC species] ... other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document [NPWS, 2014b/c].

Source: NPWS (2014b/c)

Attributes are not numbered in NPWS (2014b), but are numbered here for convenience

3.5 The favourable conservation conditions of Chough in Trawbreaga Bay SPA are defined by various attributes and targets, which are shown in Table 3.2.

Table 3.2 – Attributes and targets for the conservation objectives for breeding Chough populations in Trawbreaga Bay SPA.

Attribute	Measure	Target	Notes
1 Population trend	Percentage change	Long term population trend stable or increasing	This SPA contains coastal habitats used by chough. Nest sites have been recorded in the past at the northern end of the site. However, the main importance of this SPA to chough conservation is that it contains an important foraging resource centred on the dune system at Lag (Map 3 in NPWS, 2014) and parts of the coastal slope that support coastal heath and maritime grassland. These areas are used by recently fledged young and others particularly during the autumn period. Furthermore, the coastal cliffs contain a regularly-used communal roost site. For further information see the NPWS site synopsis (Site code: 004034); Trewby *et al.* (2006); Gray *et al.* (2003)
2 Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by chough other than that occurring from natural patterns of variation	See note above.

Source: NPWS (2014a)

Attributes are not numbered in NPWS (2014a), but are numbered here for convenience

Wetlands

3.6 The conservation objective for wetlands in Trawbreaga Bay SPA is to "*maintain the favourable conservation condition of the wetland habitat in Trawbreaga Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it*" (NPWS, 2014b).

3.7 The favourable conservation condition of the wetland habitat in Trawbreaga Bay SPA is defined by a single attribute and target, which is shown in Table 3.3.

Table 3.3 – Attribute and target for the conservation objective for wetlands in Trawbreaga Bay SPA.

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland should be stable and not significantly less than the area of 1,317 ha other than that occurring from natural patterns of variation. (See Map 3 NPWS, 2014b)	The wetland habitat area was estimated as 1,317 ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document

Source: NPWS (2014a)

Sites within 15km of Trawbreaga Bay SPA

3.8 Two Special Protection Areas are located within 15 km of Trawbreaga Bay SPA. These are Malin Head SPA (004146; 730 m north of Trawbreaga Bay SPA) and Inishtrahull SPA (004100; 11.6 km northeast of Trawbreaga Bay SPA) (Figure 3.1).

Generic Conservation Objectives

3.9 A summary of generic conservation objectives relevant to Malin Head SPA (004146) and Inishtrahull SPA (004100) is presented in Table 3.4.

Table 3.4 – Details about generic conservation objectives published for Natura 2000 sites within and beyond 15 km from Trawbreaga Bay.

Note on Generic Conservation Objectives
Specific conservation objectives have not been published for a number of Natura 2000 sites. In lieu of this generic conservation objectives have been published for each Natura 2000 site across Ireland. The overall conservation objective is "*to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA*" (NPWS, 2015). The maintenance of species and habitats at favourable conservation condition at site level will contribute to the maintenance of favourable conservation status of the species or habitat at a national level. General indications that a habitat has achieved favourable conservation status presented in the conservation objective document include when; • its natural range, and area it covers within that range, are stable or increasing, and • the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and • the conservation status of its typical species is favourable. General indications that a species has achieved favourable conservation status presented in the conservation objective document include when; • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Inishtrahull SPA (Site code: 004100)

Special Conservation Interests

3.10 The Special Conservation Interests (SCI) of the Inishtrahull SPA are non-breeding populations of Barnacle Goose and breeding populations of Shag and Common Gull (NPWS, 2006a; 2015a).

Conservation objectives

3.11 No specific conservation objectives have been published for this Natura 2000 site; see Table 3.4 for details of generic conservation objectives published by NPWS.

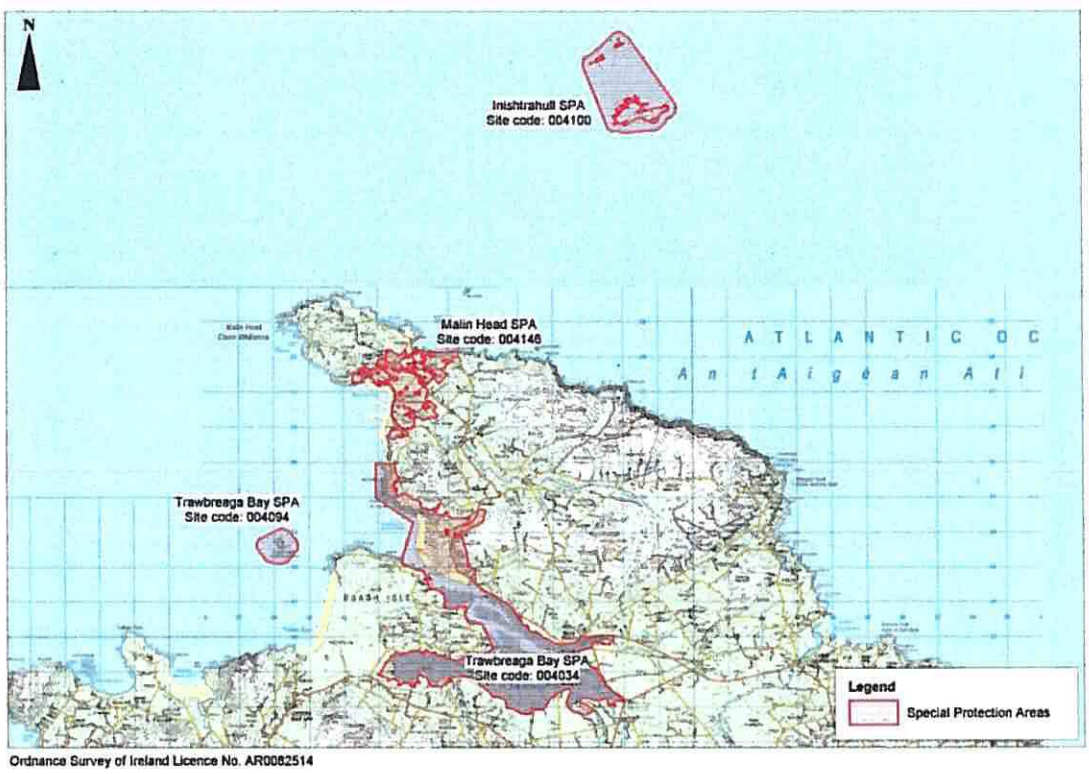
Malin Head SPA (Site code: 004146)

Special Conservation Interests

3.12 The Special Conservation Interest (SCI) of Malin Head SPA is a breeding population of Corncrake (NPWS, 2011a; 2015b).

Conservation objectives

3.13 No specific conservation objectives have been published for this Natura 2000 site; see Table 3.4 for details of generic conservation objectives published by NPWS.



Ordnance Survey of Ireland Licence No. AR0082514

Figure 3.1 - Special Protection Areas within 15km of Trawbreaga Bay SPA.

Sites outside 15km of Trawbreaga Bay SPA

3.14 A further five Special Protection Areas are located beyond the 15 km search area recommended by guidance (DEHLG, 2009) but are included due to potential interchange that may occur between the sites due to the mobile nature of birds.

3.15 The additional sites are listed below and their location is shown in Figure 3.2: -

- Lough Foyle (both ROI and NI managed sites) (15.3 km to the southeast of Trawbreaga Bay SPA) (site codes IE004087 & UK9020031, respectively);
- Lough Swilly SPA (004075; 21 km to the southwest of Trawbreaga Bay SPA);
- Horn Head to Fanad Head SPA (004194; 16.8 km west of Trawbreaga Bay SPA);
- Fanad Head SPA (004148; 20.5 km to the west of Trawbreaga Bay SPA); and
- Greers Isle SPA (004082; 24.5 km west of Trawbreaga Bay SPA).

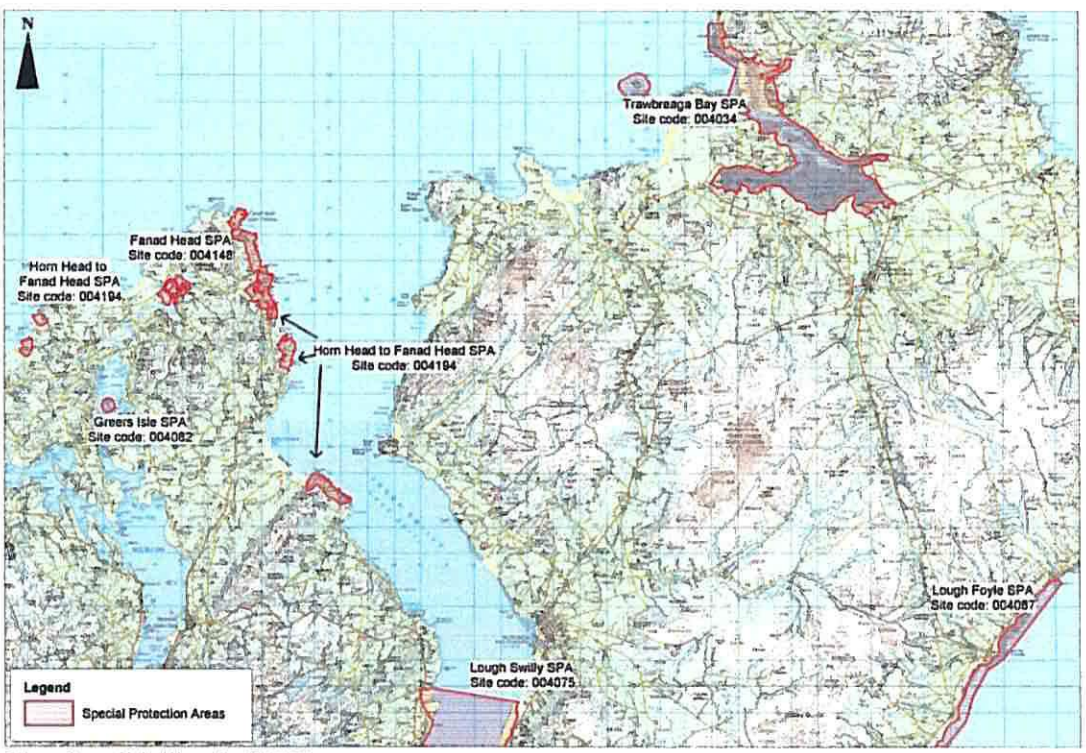


Figure 3.2 - Special Protection Areas outside of 15 km radius of Trawbreaga Bay.

Lough Foyle SPA (ROI) (Site code: 004087)

Special Conservation Interests

3.16 The Special Conservation Interest (SCI) of Lough Foyle SPA (ROI) are non-breeding populations of Red-throated Diver, Great Crested Grebe, Bewick's Swan, Whooper Swan, Greylag Goose, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Eider, Red-breasted Merganser, Oystercatcher, Golden Plover, Lapwing, Knot, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull and Herring Gull (NPWS, 2010; 2014c/d).

3.17 In addition the wetland habitat within Lough Foyle SPA is an additional Special Conservation Interest (NPWS 2014c).

Conservation objectives

3.18 The overall conservation objective for the non-breeding populations of the special conservation interests in Lough Foyle is to maintain or restore the favourable conservation condition of the species (NPWS, 2014c). Achieving favourable conservation condition on the site will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level (NPWS, 2014c)

3.19 The favourable conservation conditions of these non-breeding species in Lough Foyle SPA are defined by various attributes and targets, which are shown below in Table 3.5.

Table 3.5 – Attributes and targets for the conservation objectives for non-breeding populations of Barnacle Goose and Brent Goose in Trawbreaga Bay SPA.

Attribute	Measure	Target	Notes
1 Population trend	Percentage trend	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document [NPWS, 2014c].
2 Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by ... [the SIC species] ... other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document NPWS (2014c)

Source: NPWS (2014b)

Attributes are not numbered in NPWS (2014b), but are numbered here for convenience

Wetlands

3.20 The conservation objective for wetlands in Lough Foyle SPA is to "*maintain the favourable conservation condition of the wetland habitat in Lough Foyle SPA as a resource for the regularly occurring waterbirds that utilise it*" (NPWS, 2014c).

3.21 The favourable conservation condition of the wetland habitat in Lough Foyle SPA is defined by a single attribute and target, which is shown in Table 3.6, below.

Table 3.6 – Attribute and target for the conservation objective for wetlands in Lough Foyle SPA.

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland should be stable and not significantly less than the area of 588 ha other than that occurring from natural patterns of variation. (See Map 3 NPWS, 2014c)	The wetland habitat area was estimated as 588 ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document

Source: NPWS (2014b)

Lough Foyle SPA (NI) (Site code: UK9020031)[2]

Special Conservation Interests

3.22 In Northern Ireland the site qualifies under Article 4.1 of the Birds Directive (79/409) by regularly supporting, in winter, internationally important numbers of Whooper Swan, Light-bellied Brent Geese and Bar-tailed Godwit[3]. The site also qualifies under Article 4.2 of the Directive by supporting over 20,000 migratory wildfowl; including nationally important numbers (on an all-Ireland basis) of the following species: - Red-throated Diver, Great Crested Grebe, Mute Swan, Bewick's Swan, Greylag Goose, Shelduck, Teal, Mallard, Wigeon, Eider, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Curlew, Redshank and Greenshanke. A notable wintering population of Slavonian Grebe also occurs.

3.23 The special conservation interests for Lough Foyle SPA in Northern Ireland are nearly equivalent to those from the Lough Foyle SPA in the Republic of Ireland. Notably, an additional SCI for Lough Foyle SPA in Northern Ireland is Greenshank and Mute Swan.

Conservation objectives

3.24 The overall conservation objectives for the over-wintering species populations for which Lough Foyle SPA was designated is: -

- To maintain or enhance the population of the qualifying species;
- To maintain or enhance the range of habitats utilised by the qualifying species;
- To ensure that the integrity of the site is maintained;
- To ensure there is no significant disturbance of the species;
- To ensure that the following are maintained in the long term: -

  - Population of the species as a viable component of the site,

  - Distribution of the species within site

  - Distribution and extent of habitats supporting the species

  - Structure, function and supporting processes of habitats supporting the species; and to

[2] Lough Foyle SPA (UK 9020031) – full details of this site in Northern Ireland can be found at - http://www.doeni.gov.uk/niea/spec_protect/spec_protect_loughfoyle.shtml.

[3] Lough Foyle Citation document - http://www.doeni.gov.uk/niea/citation-3.pdf

- maintain species diversity contributing to the waterfowl assemblage.

3.25 The conservation objectives for the wetland habitats that the over-wintering species populations utilise is to : -

- Maintain or enhance the area of natural and semi-natural habitats used or potentially usable by feature bird species (2056.13 ha intertidal area) subject to natural processes
- Maintain the extent of main habitat components subject to natural processes

3.26 An additional conservation objective is to maintain or enhance sites utilised as roosts by the over-wintering species populations.

Lough Swilly SPA (Site code: 004075)[4]

3.27 Aquaculture activities in Lough Swilly have been subject to Appropriate Assessment (Gittings & O'Donoghue, 2013a).

Special Conservation Interests

3.28 The Special Conservation Interests (SCIs) of the Lough Swilly SPA include non-breeding populations of Great Crested Grebe, Grey Heron, Whooper Swan, Greylag Goose, Shelduck, Wigeon, Teal, Mallard, Shoveler, Scaup, Goldeneye, Red-breasted Merganser, Coot, Oystercatcher, Knot, Dunlin, Curlew, Redshank, Greenshank, Common Gull and Greenland White-fronted Goose and breeding populations of Black-headed Gull, Sandwich Tern and Common Tern.

3.29 In addition the wetland habitat within Lough Swilly SPA is an additional Special Conservation Interest.

Conservation objectives

3.30 The overall conservation objective for the non-breeding and breeding SCI species populations is to maintain of maintain or restore the favourable conservation status of the species (NPWS, 2002; 2011b/c).

3.31 The favourable conservation conditions of the non-breeding SCI species in Lough Swilly SPA are defined by various attributes and targets, which are shown in Table 3.7, below.

[4] Lough Swilly SPA was subject to appropriate assessment of aquaculture in 2013; *Lough Swilly Special Protection Area: Appropriate Assessment of Fisheries and Aquaculture.*

Table 3.7 – Attributes and targets for the conservation objectives for non-breeding populations of waterbirds in Lough Swilly SPA.

Attribute	Measure	Target	Notes
1 Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the SPA conservation objectives supporting document for further details
2 Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Source: NPWS (2011b/c)

Attributes are not numbered in NPWS (2011b), but are numbered here for convenience

3.32 The favourable conservation conditions of breeding SCI species in Lough Swilly SPA are defined by various attributes and targets, which are shown in Table 3.8, below.

Table 3.8 – Attributes and targets for the conservation objectives for breeding SCI species populations in Lough Swilly SPA.

Attribute	Measure	Target	Notes
1 Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh *et al.*, 1995). Mitchell *et al.* (2004) provides summary population information. The Seabird Monitoring Programme (CMP) also provides background data (JNCC, 2011)
2 Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh *et al.*, 1995)
3 Distribution: breeding colonies	Distribution	No significant decline	The only known breeding site for Sandwich Tern is on Inch Island.

Source: NPWS (2011b); References quoted from NPWS, 2011b.

Attributes are not numbered in NPWS (2011b), but are numbered here for convenience

Wetlands

3.33 The conservation objective for wetlands in Lough Swilly SPA is to "*maintain the favourable conservation condition of the wetland habitat in Lough Swilly SPA as a resource for the regularly occurring migratory waterbirds that utilise it*" (NPWS, 2011b).

3.34 The favourable conservation condition of the wetland habitat in Lough Swilly SPA is defined by a single attribute and target, which is shown in Table 3.9, below.

Table 3.9 – Attribute and target for the conservation objective for wetlands in Lough Swilly SPA.

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat is stable and not significantly less than the areas of 4,162, 2,419, 201 and 317 hectares for subtidal, intertidal, supratidal and lagoon (and associated) habitats respectively, other than that occurring from natural patterns of variation. (See map 7; NPWS, 2011b).	Wetland areas defined as follows: subtidal - seaward extent of SPA boundary up to MLWM; intertidal - MLWM to MHWM; supratidal - MHWM to SPA boundary minus the area of terrestrial habitat; lagoon (and associated) habitats - lagoon extent and adjacent wetland habitat as defined by embankments

Source: NPWS (2011)

Fanad Head SPA (Site code: 004148)

Special Conservation Interests

3.35 The Special Conservation Interest (SCI) of Fanad Head SPA is the breeding population of Corncrake (NPWS, 2011d; 2015c).

Conservation objectives

3.36 No specific conservation objectives have been published for this Natura 2000 site; see Table 3.4 for details of generic conservation objectives.

Horn Head to Fanad Head SPA (Site code: 004194)

Special Conservation Interests

3.37 The Special Conservation Interests (SCIs) of the Horn Head to Fanad Head SPA include non-breeding populations of Greenland White-fronted Goose and Barnacle Goose and breeding populations of Fulmar, Cormorant, Shag, Peregrine, Kittiwake, Guillemot, Razorbill and Chough (NPWS, 2006b; 2015d).

Conservation objectives

3.38 No specific conservation objectives have been published for this Natura 2000 site; see Table 3.4 for details of generic conservation objectives.

Greers Isle SPA (Site code: 004082)

Special Conservation Interests

3.39 The Special Conservation Interests (SCIs) of the Greers Isle SPA include breeding populations of Black-headed Gull, Common Gull and Sandwich Tern (NPWS, 2006c; 2015e).

Conservation objectives

3.40 No specific conservation objectives have been published for this Natura 2000 site; see Table 3.4 for details of generic conservation objectives.

4. Screening

Trawbreaga Bay SPA

4.1 All three species for which Trawbreaga Bay has been designated are considered in full in the appropriate assessment, below.

Inistrahull SPA

4.2 Inistrahull SPA is designated for non-breeding Barnacle Geese and breeding Shag and Common Gull.

4.3 **Barnacle Geese** will be returned to as part of the Trawbreaga Bay assessment presented below.

4.4 **Shag** - 127 pairs bred at Inishtrahull in 1999; higher numbers bred in 1991/92 (500 pairs). Shag typically occurs in both offshore and inshore marine waters but usually do not range far from the coast (Cramp and Simmons, 2004). From radio-tagging studies, Wanless *et al.* (1991) found that the mean foraging range of Shags from a colony on the Isle of May in Scotland was 7km (maximum 17km) and that all feeding sites were within 7km of land. In their study, Shags fed most frequently in water depths of 21-40 m, with substrates of either gravel and sand, or rock with thin patchy sediment cover. Using data on duration of foraging trips and flight speeds, Pearson (1968) estimated a maximum foraging range of 19km from a breeding colony on the Farne Islands in England, while Furness and Barrett estimated a median foraging range of 12 km from a colony in Norway; this method is likely to overestimate foraging ranges. Rees (1965, quoted by Cramp and Simmons, 2004) reported a foraging range of 13 km from a roosting area.

4.5 The Seabird Wikispace gives a mean foraging range of 6.5km, a mean maximum of 16km and a maximum of 20km from breeding colonies. It describes key foraging habitats as: "*shallow waters, particularly over sand and gravel banks, areas of high tidal flow.*" Shags feed on benthic and demersal prey and can dive up to depths of 70m, with a mean dive depth in the data collated by the Seabird Wikispace of 33m.

4.6 Shag feed almost exclusively on fish which it takes predominantly from midwater, though it also occasionally feeds on bottom dwelling species in coastal areas; they also take small numbers of polychaetes, cephalopods and other molluscs (small, usually benthic crustaceans) The fish component of its diet varies with both season and locality but is generally dominated by sand-eel, herring, and cod, amongst other fish species and some crustaceans (Cramp and Simmons, 2004).

4.7 There is no evidence as to the extent of use of the inner parts of Trawbreaga Bay by breeding Shag or by wintering birds; though it is to be expected that birds would especially use the western approaches to Trawbreaga and offshore waters (IWeBS data suggest that they are present in Trawbreaga in winter months). That said licenced and proposed aquaculture activities would appear to be on the outer edge of core foraging ranges of breeding birds; >12km. Overall, due to the proposed scale, distance from Inishtrahull and possible influence of trestles as fish attracting devices - it is unlikely that the intertidal oyster culture would have a negative impact on Shag breeding at Inishtrahull SPA. Shag breeding on Inistrahull SPA is therefore screened out and will not be considered further.

4.8 **Common Gull** – 30 pairs of Common Gull were recorded as breeding on Inishtrahull in 1999. Common Gull foraging ranges are not well reported in the literature, but Common Gulls do frequently occur as scavengers following ships in offshore waters during winter; however it seems to be largely limited to the coastal and littoral zone as an active forager for live prey (Cramp and Simmons, 2004). Common Gull has a broad dietary range and uses a wide range of feeding

methods in a variety of habitats. In coastal and marine habitats their diet can include: benthic invertebrates in intertidal habitats; invertebrates, fish and scavenged items taken from the pelagic zone whilst swimming or from plunge dives whilst flying; and food items taken by kleptoparasitism. They regularly follow inshore fishing boats and also feed commonly in terrestrial habitats. In coastal and marine areas, molluscs, polychaetes, crustaceans and fish can all be significant components of Common Gull diets. As for Black-headed Gulls, recent studies of Irish breeding colonies suggest that during the breeding season terrestrial habitat use and prey items dominate (Kelly *et al.*, 2012).

4.9 Overall, due to the proposed scale of oyster cultivation and the distance from Inishtrahull it is unlikely that the intertidal oyster would have a negative impact on Common Gull breeding at Inishtrahull SPA.

Malin Head SPA

4.10 Malin Head SPA is designated for **Corncrake**. The Corncrake is included on the red list of Birds of Conservation Concern (Colhoun and Cummins, 2013) due to significant declines in the Irish breeding populations; due in a large part to agricultural intensification. It occurs on a number of coastal headlands, such as Malin, and offshore islands such as Greers Isle SPA (4082). In terms of habitat use Corncrake favour dense vegetation such as hay meadows. Proposed aquaculture activities at Trawbreaga will not negatively impact on Corncrake either directly or indirectly through loss of prey / habitat.

4.11 As Malin Head SPAs only qualifying interest is Corncrake, this site is therefore screened out from further consideration.

Lough Foyle / Lough Swilly

4.12 Lough Foyle and Lough Swilly bound the Inishowen Peninsula to the east and west, respectively. As noted Lough Swilly was subject to an appropriate assessment in 2013 (Gittings and O'Donoghue, 2013a). Lough Swilly is ca. 21km from Trawbreaga in a direct line; but is nearer 35km around the coast. Lough Foyle is just over 15km (overland) to the southeast of Trawbreaga. Of the qualifying interests designated for each site we are aware of no published data on interchange of waders and wildfowl between the sites. It is certainly possible that migrants which breed in Iceland (or further afield) may make landfall at sites such as Trawbreaga before travelling south through sites such as Lough Swilly, or indeed Lough Foyle; particularly for species such as Light-bellied Brent Geese and Whooper Swan. However, it would seem highly unlikely that aquaculture developments at Trawbreaga would affect patterns of seasonal use of either Lough Swilly or Lough Foyle by such species.

4.13 Both Sandwich Tern and Common Tern breed at Inch in the southern section of Lough Swilly. Sandwich Tern favour "*shallow marine waters such as bays, inlets and outflows, gullies, shoals, inshore waters, reefs, and sandbanks; also more open waters nearshore or offshore, including open sea*" (Source: Seabird Wikispace); mean foraging range is 15km; this would place them predominantly in waters west of Trawbreaga; though the mean maximum published foraging range of 42km would allow Swilly birds to forage as far north as Trawbreaga. Overall, due to the proposed scale, distance from the Inch breeding colony and the possible influence of trestles as fish attracting devices - it is unlikely that the intertidal oyster would have a negative impact on Sandwich Tern breeding at Lough Swilly SPA. Furthermore, note that should Sandwich Tern forage in Trawbreaga it would be at high tide when there would be no maintenance activities ongoing; NPWS note that an estimated 80% of the bay area is exposed at each low tide (Natura 2000 form; update 2014-09) making it largely unsuitable to foraging terns at low tide. In contrast, Common Tern tend to feed closer to their colony; mean foraging range of 9km, a mean maximum

of 34km. It would seem very unlikely that Common Tern from the Inch colony at Lough Swilly feed in Trawbreaga – other than perhaps during post-breeding dispersal.

4.14 Both Lough Foyle and Lough Swilly SPAs are therefore screened out from further consideration.

Fanad Head SPA

4.15 As for Malin Head SPA, Fanad Head SPA is designated solely for **Corncrake.** Proposed aquaculture activities at Trawbreaga will not negatively impact on Corncrake either directly or indirectly through loss of prey / habitat; this site is therefore screened out from further consideration.

Horn Head to Fanad Head SPA

4.16 Horn Head to Fanad Head is designate for a range of qualifying interests, including two geese species, namely Greenland White-fronted Goose and Barnacle Goose.

4.17 Both Greenland White-fronted Geese and Barnacle Geese favour New Lake near Dunfanaghy (196 and 160, respectively; averages 1995/96-1999/00); this site is just over 40km to the southwest of Trawbreaga. There's no evidence of Greenland White-fronted Geese using Trawbreaga.

4.18 **Barnacle Geese** will be returned to below as part of the Trawbreaga Bay assessment presented below.

4.19 This site is also designated for two terrestrial species, namely Chough and Peregrine. Horn Head to Fanad Head SPA supports an important population of breeding Chough (22 breeding pairs in 1992; 32 in 2002/03). As noted above **Chough** favour coastal grassland; while we are not aware of any information on interchange of Chough between Trawbreaga and Fanad, as for Trawbreaga no impact from intertidal aquaculture is predicted. Chough at this site is therefore not considered further.

4.20 No information is available about the occurrence of visiting **Peregrine** from Horn Head to Fanad Head SPA within Trawbreaga Bay. However, an assessment of likely patterns of occurrence can be made, based on information about the species breeding dispersion and foraging behaviour. The recorded breeding dispersion of Peregrine in Britain and Ireland varies from 2-5 km (nearest neighbour difference; Ratcliffe, 1993). The Horn Head to Fanad Head SPA is noted as holding a large Peregrine population (7 pairs in 2002) (NPWS site synopsis; 2006); however, the SPA is a series of blocks distributed across over 70km of coastline; giving a density of ca. 1 nest / 10km. The nearest nest(s) within the SPA is certainly likely to be on the coast from Fanad Head south to Saldanha Head – between about 17km and 20km from Trawbreaga. However, it is equally likely that Peregrine are in fact nesting closer to Trawbreaga in the Malin Head area.

4.21 Ratcliffe (1993) classifies Peregrine breeding habitats in Britain into six categories, based on their prey resources. In the "ordinary coast" category, which may correspond to much of the Horn Head to Fanad Head SPA, around one-third of the prey-type by weight comprises waders and gulls and terns. Coastal birds also take large numbers of feral pigeon and Jackdaw. The seabird colonies around Fanad Head are likely to provide a major component of the diet of Peregrines breeding at eastern end of the SPA (supporting as they do an assemblage of over 20,000 seabirds (NPWS site synopsis; 2006). Peregrine also regularly feed in intertidal areas during winter, exploiting the availability of large numbers of waterbirds, which provide them with potential prey, and inland breeding Peregrines will often move to the coast in winter for this reason.

4.22 Peregrines are territorial during the breeding season and their foraging range may depend upon the local population density: for example, Peregrines in north-east Scotland mainly feed within 2

km of their nest site, but their foraging range can be extended to 6 km or more, while in continental Europe, the foraging ranges may extend up to 15 km or more from nest sites (Cramp and Simmons, 2004). The foraging range of breeding Peregrines will be dictated by the availability of food resources and at coastal eyries close to large seabird colonies, "*Peregrines often hunt directly from the eyrie and kill within a few hundred metres*" (Ratcliffe, 1993).

4.23 In conclusion, it seems likely that the intertidal oyster cultivation area provides potentially suitable feeding habitat and is within the foraging range of at least one pair of the SPA Peregrine population. However, the availability of high quality food resources closer to this pair (the Horn Head – Fanad Head seabird population), and the low numbers of waterbirds that will be present during most of the Peregrine's breeding season, indicate that the intertidal oyster cultivation area is probably not of major importance as feeding habitat for the SPA Peregrine population.

4.24 Horn Head to Fanad Head SPA is also designated for a number of breeding **seabirds**; namely Fulmar (1.974 pairs), Cormorant (79 pairs), Shag (110 pairs), Kittiwake (3,853 pairs), Guillemot (4,387 pairs) and Razorbill (4,515 pairs) (all counts from 1999; NPWS Site synopsis, 2006)[5], Survey work undertaken at Horn Head in the summer of 2015 (Newton *et al.*, 2015) indicated that both Fulmar and Kittiwake numbers have decreased strongly, while Guillemot numbers have decreased to a lesser degree. In contrast Razorbill numbers are stable; Horn Head is the 2nd most important colony for this species in Ireland. Fulmar, Kittiwake, Guillemot and Razorbill will all tend to forage at sea rather than in sheltered tidal inlet such as Trawbreaga. Development of intertidal oyster cultivation in the bay does not present a risk to these species.

4.25 **Shag** was discussed above (para. 4.9-4.12) with respect to birds nesting on Inistrahull. As noted published data indicates a mean foraging range of 6.5km, a mean maximum of 16km and a maximum of 20km from breeding colonies. It is not known where within the SPA the main Shag colony is located; a conservative approach has therefore been taken to consider the nearest cliffs at Fanad Head as potentially supporting breeding Shag. As noted Horn Head to Fanad Head SPA is spread over an array of discrete blocks covering coastal cliffs – generally separated by areas of beach / dunes. The nearest such nesting sites is over 19km from the mouth of Trawbreaga Bay, putting the bay at the outer extreme of recorded foraging distances. Overall, due to the proposed scale, distance from Horn Head to Fanad Head SPA, availability of suitable foraging grounds around Fanad Head and possible influence of trestles as fish attracting devices - it is unlikely that the intertidal oyster would have a negative impact on Shag breeding at Horn Head to Fanad Head SPA. Shag breeding on Horn Head to Fanad Head SPA is therefore screened out and will not be considered further.

Cormorant - It is not known where within the SPA the main Cormorant colony is located; a conservative approach has therefore been taken to consider the nearest cliffs at Fanad Head as potentially supporting breeding Cormorant; i.e. just over 19km from the mouth of Trawbreaga Bay. The mean foraging range of Cormorants from their breeding colonies is 8.5 km, with a mean maximum of 32 km and a maximum of 50 km (Seabird Wikispace; http://seabird.wikispaces.com/). Therefore, the intertidal oyster cultivation area is within the potential foraging range of the SPA population, but may only be a peripheral area.

4.26 In winter, Cormorant regularly occur within Trawbreaga Bay; in the NPWS baseline waterbird survey Cormorant was recorded on all counts (peak count, 10; mean count, 4); it is not known to what extent, if any, Cormorants use Trawbreaga in summer. Only 4 IWeBS counts have been undertaken at Trawbreaga Bay since the baseline waterbird survey in 2009/2010. Single cormorants were recorded during counts in November 2010 and 2011.

[5] The site also supports Black Guillemot (204 individuals) as well as smaller populations of Puffin (189 pairs), Herring Gull (21 pairs), Great Black-backed Gull (5 pairs) and Common Gull (2 pairs).

4.27 In a study of Cormorant diet at several Irish coastal breeding colonies West *et al.* (1975), found that birds at the Lambay Island, Mattle and Little Saltee colonies were taking fish species associated with estuarine habitats. At Mattle and Little Saltee, wrasse predominated (77% and 85% of the diet by weight, respectively) indicating that the birds were mainly feeding in marine habitats. However, West *et al.* (1975) considered that, due to the absence of wrasse from their diet, the Lambay Island birds were mainly feeding in the estuaries at Rush and Malahide rather than in the marine waters around Lambay Island. However, birds from the Keeragh Island colony appeared to be feeding exclusively on marine fish, despite Keeragh Island being closer to estuarine habitat compared to the Little Saltee. The diet of Cormorants from two other breeding colonies (Great Saltee and Roaninish) was studied by Tierney *et al.* (2011). Again, wrasse predominated forming 65-70% of the diet by item, but some flatfish were taken indicating some foraging in estuarine habitats.

4.28 Overall, therefore, the available evidence from both the typical foraging range and diets of breeding Cormorants indicates that both Trawbreaga Bay in general and the intertidal oyster cultivation area in particular, may provide potential foraging habitat for the SPA Cormorant population but that these areas are not likely to be of major importance in providing food resources for this population.

Greers Isle SPA

4.29 The qualifying interests of Greers Isle SPA are Sandwich Tern, Black-headed Gull and Common Gull.

4.30 **Sandwich Tern** were recorded breeding on Greers Isle in the 1984 tern census (180 pairs); subsequently in the 1995 census none were recorded (Hannon *et al.*, 1997; NPWS site synopsis, 2006. However, the site has been reoccupied since 2002; with 217 pairs recorded in 2004 (along with small numbers of Common Tern and / or Arctic Tern) (NPWS site synopsis, 2006). Greers Isle is between ca. 26km to 30km from the mouth of Trawbreaga Bay depending on whether birds fly overland or around the coast. For the reasons outlined in paragraph 4.15 it is very unlikely that Sandwich Tern from the Greers Isle colony would be affected by aquaculture activities at Trawbreaga Bay.

4.31 **Black-headed Gull** – in 2002 Greers Isle supported ca. 200 breeding pair of Black-headed Gull (NPWS site synopsis, 2006). Black-headed Gull typically occurs in "*inshore tidal waters, avoiding rocky or exposed coasts and preferring inlets or estuaries with extensive sandy or muddy beaches*" (Cramp and Simmons, 2004). While they can occur in deeper offshore waters, mapping studies indicate that they only do so occasionally and at low density (e.g., Kubetzki and Garthe, 2003). Black-headed Gulls have a broad dietary range and use a wide range of feeding methods in a variety of habitats. In coastal and marine habitats their diet can include: benthic invertebrates in intertidal habitats; invertebrates, fish and scavenged items taken from the pelagic zone whilst swimming or from dips-to-surface and surface plunges whilst flying; and food items taken by kleptoparasitism. Black-headed Gulls also feed commonly in terrestrial habitats.

4.32 In the breeding season, earthworms and insects are described as predominating in their diet, although this probably reflects the distribution of colonies, which are mainly inland. At the Lady's Island colony in Wexford, Black-headed Gulls also feed extensively in terrestrial habitats, taking worms, beetles and small mammals, as well as frogs and, through kleptoparasitism of terns, fish (T. Murray, NPWS). On the sea coast, the "*surface fauna of exposed mudflats and shallows*" are described as providing a "*rich food supply*". In studies of two coastal colonies in the North Sea bivalves and polychaetes were the major components of their diet (Kubetzki and Garthe, 2003) and fish were only a minor component.

4.33 Greers Isle is a small island located in the northern reaches of Mulroy Bay, with Ballyhiernan Bay and Fanad Head to the north and Lough Swilly to the east. There is a diverse range of agricultural grassland; freshwater loughs; and sheltered intertidal and subtidal waters offering a diverse array of foraging habitat close to the breeding grounds. Furthermore, recent studies of Irish breeding colonies suggest that during the breeding season terrestrial habitat use and prey items dominate. Thus, it is very unlikely that Black-headed Gull from the Greers Isle colony would be affected by aquaculture activities at Trawbreaga Bay.

4.34 **Common Gull** - in 2002 Greers Isle supported ca. 30 breeding pair of Common Gull. This species was discussed in para. 4.8-4.9 for Insihtrahull SPA. As is the case for Black-headed Gull, it is very unlikely that Common Gull from the Greers Isle colony would be affected by aquaculture activities at Trawbreaga Bay.

5. Intertidal oyster cultivation

History of activity

5.1 Oyster production has been operational in Trawbreaga Bay since the late 1990's. However, licences for aquaculture activities were not issued until early in the 2000's. In 2001, there were 26 licences to farm oysters in Trawbreaga Bay (BIM, 2014). Currently there are 23 valid oyster production licences and a further 44 new applications (Figure 5.1).

Plate 5.1 – Example of an Oyster bag on a trestle at Ballymacoda Bay, Co. Cork.

Plate 5.2 – An example of Oyster husbandry activity at Dungarvan Harbour, Co. Waterford.

Description of activity

5.2 Current oyster cultivation within Trawbreaga SPA (and North Inishowen Coast 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 North Inishowen Coast SAC when G4 to G8 (6 – 10mm, respectively) oyster seed is brought to the service site either in spring or late summer of each year. Oyster bags vary in mesh size (4mm, 6mm, 9mm and 14 mm) depending on oyster stock grade. For example 6mm seed is put into 4mm mesh bags at a ratio of 1000 to 1500 seed per bag. Both Diploid and Triploid oysters are grown in Trawbreaga Bay. Though the majority of producers are now moving into triploid production of all their stock as it appears to perform well in the area. The oyster seed is bought in from oyster nurseries in France or the UK and include: GrainOcean, France Turbot, Satmar and France Nissian.

5.3 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 2.5 to 4 years, where they will have reached 60 or 80 to the kilo. At reaching market size oysters are in bags of about 120. Some farmers also take in half grown oysters and contract grow for local farmers in the area.

There are three main pacific oyster production areas within Trawbreaga Bay; the North and South of the bay, with one producer farming in the West of the bay. 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 North of the Bay, eight of the producers observe one access route from the shore to their farm area, with a maximum of five tractors active in the area at any one time. In the south of the Bay six active producers observe access growing areas using one dedicated access route from the shore. At any one time depending on times of grading and selling stock there can be up to three tractors and trailers operating across the area. In the west of the bay one producer uses a dedicated access route to the farm. This access route is a public road. Access points are illustrated in Figure 5.1. The actual path of proposed access tracks across the foreshore are illustrated in Figure 5.2.

Potential impacts

Ecosystem effects

5.4 The boundary of Trawbreaga Bay SPA was defined by NPWS to include the primary wetland habitats of this site and this total wetland area is estimated to be 1,317 ha. In addition, 232 ha of terrestrial habitat was included within the site for Chough. This gives a total combined SPA area of 1,549 ha. For Trawbreaga Bay SPA the area of intertidal habitat is estimated to be 827 ha; while there is ca. 314 ha of subtidal habitats, such as tidal river, creeks and channels. There is a further 176 ha of supratidal habitat (i.e. above mean high water mark) (from NPWS, 2014b).

5.5 The area of existing aquaculture activities is 17.08 ha; new applications cover a further 68.8 ha. If all were granted permission to proceed with aquaculture activities, licenced plots for the cultivation of oyster would cover 85.88 ha within Trawbreaga Bay. This amounts to 1.3% (current licences); 5.22% (new applications) and 6.52% (all licences) of available primary wetland habitats.

5.6 Within the bay current and proposed licence blocks are centred on IWeBS subsites 0A438, 0A439 and 0A442[6]. The approximate area of intertidal habitat (i.e. equivalent to mudflats and sandflats not covered by seawater at low tide *1140*) in these blocks is 106.8 ha, 395.42 ha and 105.38 ha, respectively (see Table 5.1).

5.7 The area under aquaculture in each in IWeBS subsites is 8.24 ha, 43.28 ha and 34.36 ha, respectively; this equates to 7.0%, 5.06% and 13.98% of available intertidal habitat, respectively within each subsite. Overall this would represent a combined total of 9.47% of available intertidal habitat within the IWeBS subsites 0A438, 0A439 and 0A442. However, large areas of additional intertidal habitat are also located in IWeBS subsites 0A440 (southeastern corner) and near the entrance to Trawbreaga Bay (not counted by IWeBS); there are no aquaculture sites in these area. Thus, based on all areas of intertidal habitat throughout Trawbreaga Bay; it would represent a combined total of 6.96% of available intertidal habitat (57.58 ha from a total of 827 ha of intertidal habitat).

Table 5.1 – Area of intertidal habitat by count subsite; compared to areas occupied by aquaculture.

Subsite	Area of BWI count subsite (ha)	Area of intertidal habitat (1140) per subsite (ha / %)	Total area of aquaculture per subsite (ha)	Total area under aquaculture in intertidal habitat (1140) (ha)	% of intertidal habitat occupied / per subsite
0A438	143.4	106.8 (74.47%)	8.24	7.48	7.0%
0A439	493.2	395.42 (80.17%)	43.28	35.17	8.9%
0A442	215.0	105.38 (49.01%)	34.36	9.8	9.3%
	851.60	**607.6**	**85.88**	**45.7**	**7.52%**
All available intertidal habitat in Trawbreaga		**827 ha**			**5.53%**

5.8 Given the small-moderate scale of intertidal oyster cultivation proposed for Trawbreaga, in relation to the overall size of the bay, the trophic pathways involving intertidal oyster cultivation are unlikely to form a major component of the overall food web system, and, therefore, ecosystem level effects on benthic invertebrates and fish populations are unlikely to occur. However, the placement of licence T12/492A across the mouth of Ballymacmoriarty Bay is such that impacts on patterns of water flow and sediment deposition / erosion, due to the proposed trestles blocking tidal flow in and out of the bay, cannot be discounted.

[6] Licence no. T12/492A is almost equally split between count sectors 0A438 & 0A439; i.e. 52.3% (8.235 ha) and 47.7% (7.34 ha), respectively.

Habitat structure

5.9 Intertidal oyster cultivation causes a significant alteration to the intertidal habitat suitable for bird usage through the placement of physical structures (oyster trestles) on the intertidal habitat. This alteration may alter the suitability of the habitat for waterbirds by interfering with sightlines and/or creating barriers to movement. Based on the characteristics of species showing positive/neutral or negative responses to trestles, we have hypothesised that trestles may interfere with flocking behaviour causing species that typically occur in large, tightly packed flocks to avoid the trestles (Gittings and O'Donoghue, 2012). Trestles could also interfere with the visibility of potential predators causing increased vigilance and reduced foraging time, while they may also interfere with the ability of hunting raptors to detect and capture prey.

Food resources

Benthic fauna

5.10 Intertidal oyster cultivation may cause impacts to benthic invertebrates through sedimentation and eutrophication, and this could potentially affect food resources for waterbird species.

5.11 In a review of the literature, Dumbauld *et al.* (2009) found variation in the effects of intertidal oyster cultivation on the benthic fauna. In studies in England, France and New Zealand, intertidal oyster cultivation caused increased biodeposition, lower sediment redox potential and reduced diversity and abundance of the benthic fauna. However in studies in Ireland and Canada, few changes in the benthic fauna were reported, due to high currents preventing accumulation of biodeposits.

5.12 The Irish study referred to above was carried out at Dungarvan Harbour (De Grave *et al.*, 1998). This study compared an oyster trestle block (in the north-eastern section of the main block of trestles) with a control site approximately 300 m away, with both areas being at the mean tide level. Within the trestle block areas underneath trestles and areas in access lanes were compared. The study found no evidence of elevated levels or organic matter or high densities of organic enrichment indicator species within the trestle blocks. There were minor differences in the benthic community between the control area and the areas sampled under the trestles (higher densities of *Nephtys hombergii*, *Bathyporeia guiiliamsoniana*, *Gammarus crinicomis*, *Microprotopus maculatus* and *Tellina tenuis* including increased abundance of *Capiteila capitata* in the latter area), but these were considered to be probably due to increased predation by epifaunal decapods and fishes. There appeared to be stronger changes in the benthic community in the access lanes with increased densities of three polychaete species (*Scolopos armiger*, *Eteone longa* and *Sigalion mathildae*) and higher overall diversity, and these changes were considered to be due to the compaction of the habitat by vehicular traffic.

5.13 In more recent work commissioned by the Marine Institute, Forde *et al.* (2015) looked at benthic invertebrates along access tracks, under trestles and in close controls at a number of sites nationally. There was a strong site effect from the study in that significant differences were observed using a variety of invertebrate response (dependent) variables among the sites. Access routes were considered more disturbed than trestle and control locations; most likely due to the influence of compaction from regular vehicle movements. Abundance (among other variables) was significantly higher in control and trestle samples when compared with those derived from access routes. No noticeable difference between control and trestle samples was detected. Therefore, this research indicates that intertidal oyster cultivation is unlikely to have had major impacts on food resources for waterbirds that feed on benthic fauna (Forde *et al.*, 2015).

5.14 Introduction of trestles to sand / mudflats provides a 3-dimensional structure upon which a range of algal species can grow; especially green algae favoured by Light-bellied Brent Geese (see e.g. Plate 5.1). The species type and density of growth is influenced by the level of site maintenance as bags are routinely turned and cleaned to ensure unobstructed flow of oxygenated water to

oysters within the bags. Where little maintenance occurs a fucoid community can however develop; at this stage the trestles provide feeding opportunities for species such as Herring Gull, Oystercatcher and Hooded Crow which target associated invertebrate fauna. Higher levels of maintenance favour the smaller green and purple algae; growth will also be influenced by nutrient levels within the estuary and water temperature and thus this resource can be quiet substantial in autumn when birds first arrive.

Disturbance

5.15 Intertidal oyster cultivation can require intensive husbandry activity and this may cause impacts to waterbirds using intertidal and/or shallow subtidal habitats through disturbance. Disturbance will not affect high tide roosts, or waterbirds that mainly, or only, use trestle areas when they are covered at high tide because no husbandry activity takes place during the high tide period. The trestle study (Gittings and O'Donoghue, 2012) examined the combined potential effects of habitat alteration and disturbance from husbandry activity. The sites included in the study included some with very high levels of husbandry activity. Therefore, it is not necessary to consider the disturbance component of the potential impacts separately in relation to potential impacts on waterbirds at low tide.

5.16 Aquaculture husbandry activities were amongst five different activities that were recorded to cause disturbance to waterbirds at Trawbreaga Bay during the NPWS baseline waterbird surveys in 2009/2010. Aquaculture activities (both machinery and workers walking in the intertidal area) was one of the most frequently recorded activities along with walking (including with dogs) (NPWS, 2014a).

5.17 Disturbance events associated with aquaculture husbandry activities were most frequently recorded in subsite 0A442 (north central) and was caused both by machinery and workers walking on the intertidal zone (NPWS, 2014a).

5.18 Disturbance was also noted by an aquaculture worker in the intertidal area who was accompanied by a dog in the area northwest of Glassagh Point. No specified date was noted on the data sheet however the record was made during site usage surveys undertaken between 2007 and 2009.

5.19 In July 2014 a planning application was made to construct 7 sheds for shellfish handling facilities (submitted 30/7/2014). The proposal included the construction of a site entrance off a private lane, landscaping of the boundaries, placement of boulders along the seaward boundary, floodlighting and associated developments and site works (File Application Number: 14/50918; Donegal County Council online Planning Enquiry System [accessed July, 2015]). Donegal Council subsequently requested that an Appropriate Assessment of the proposed development be prepared and submitted to the planning authority.

5.20 A draft Natura Impact Statement produced as part of the planning application did not identify any significant effects on Light-bellied Brent or Barnacle Geese in Trawbreaga Bay SPA during the construction phase of the project provided that the construction of the sheds was undertaken from May to September (inclusive) when the birds are on their breeding grounds. The NIS states that if construction is to occur during the period when these species are present in Trawbreaga Bay, then the perimeter barrier should be erected first to provide screening of the construction work from the birds (Marchant, 2014).

5.21 The NIS also details the steps to be taken to reduce the potential effect of disturbance on Light-bellied Brent and Barnacle Geese during the operational phase. These include the erection of wooden screens, boulders and hedgerows along the perimeter boundary to reduce the effects (noise and visual disturbance) of shellfish processing activities from SCI birds on the shoreline. In addition, any lighting installations are required to be directional to ensure light is not spread onto

the adjacent shoreline with lighting only to be used during shellfish processing operations and not for security purposes (Marchant, 2014).

5.22 During the NPWS baseline waterbird survey, Barnacle geese were recorded roosting in the intertidal area of subsite 0A440 in the southeast corner of Trawbreaga Bay on two occasions. The flocks consisted of 60 and 20 birds and were both recorded on low tide counts. The use of intertidal habitats by Barnacle geese is therefore considered below.

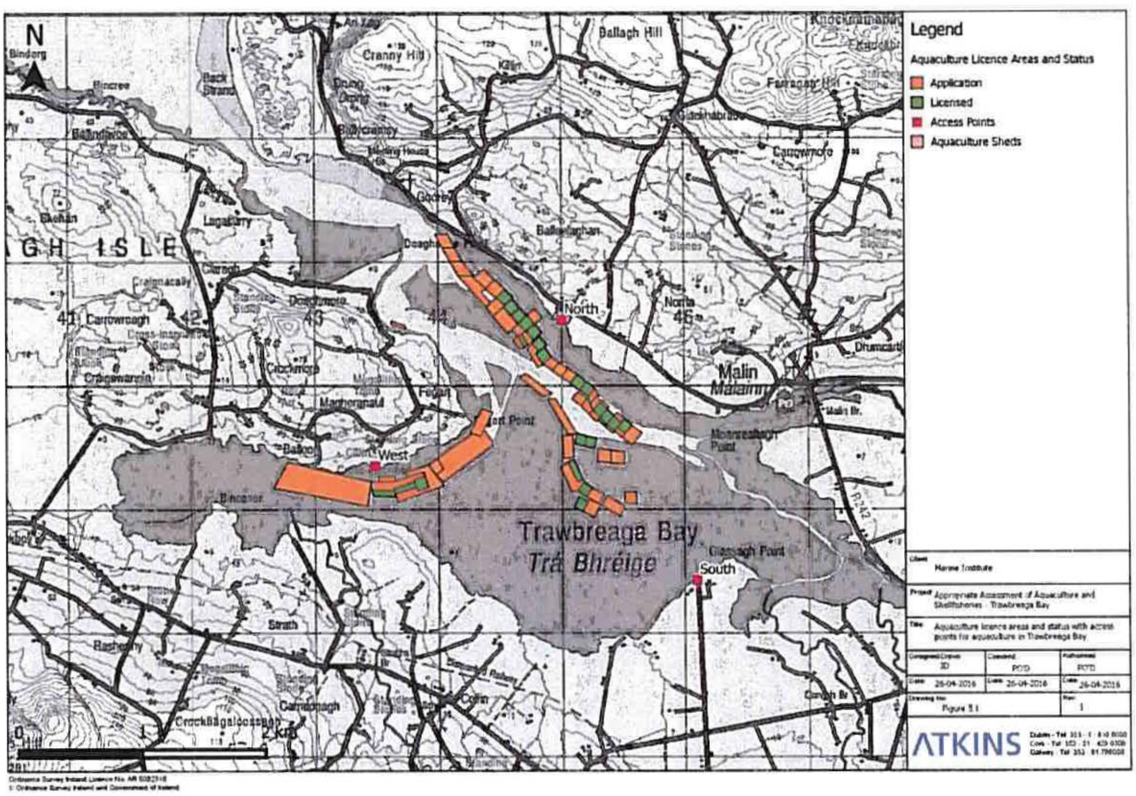

Legend
Aquaculture Licence Areas and Status
Application
Licensed
Access Points
Aquaculture Sheds
Trawbreaga Bay
Trá Bhréige
North
West
South
Malin
Ballagh Hill
Cranny Hill
Marine Institute
Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Aquaculture licence areas and status with access points for aquaculture in Trawbreaga Bay
3D
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Figure 5.1
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ATKINS

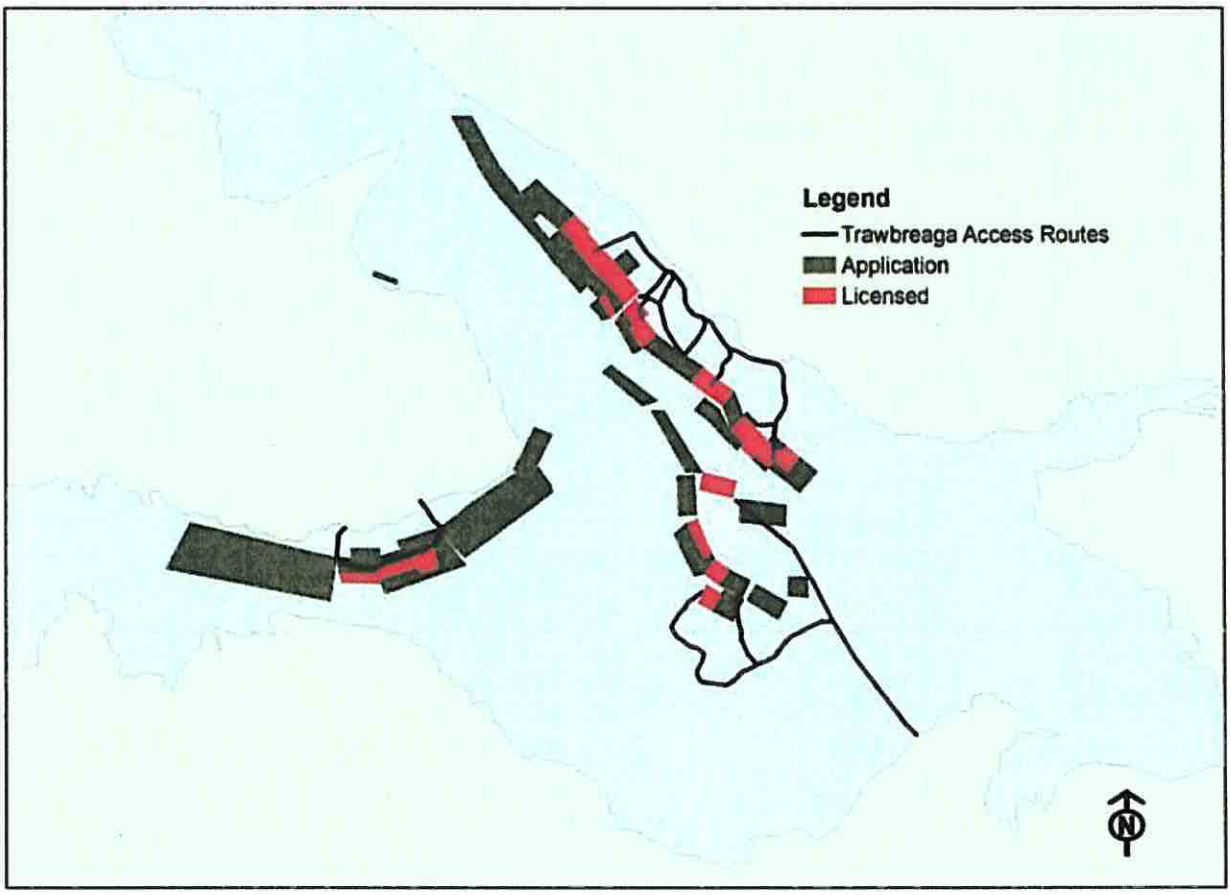


Figure 5.2 – Proposed Access Routes (copy of Figure 5.2, SAC Assessment).

6. Assessment of SCI species in Trawbreaga Bay SPA

Chough

Status of Chough

6.1 The Atlantic and Celtic Sea coasts of Ireland support the majority of the Northwest European population of Choughs. Census counts of Chough have been undertaken in Ireland at roughly decadal intervals over the last 40 years (Cabot 1965, Bullock *et al.* 1983a, Bullock *et al.* 1983b, Berrow *et al.* 1993 all cited in Gray *et al.* 2003). The early surveys estimated the population to number in the range of 567 to 685 pairs. Additional coverage and survey effort in the 1992 survey reported a maximum of 906 pairs of Choughs with an additional 821 birds in flocks in Ireland representing over 70% of the northwest European population (Berrow *et al* 1993 cited in Gray *et al.* 2003). The 2002/2003 survey recorded a total of 838 breeding pairs of Chough with 388 confirmed, 57 probable, and 393 possible breeding pairs. A further 756 birds were recorded in flocks. The largest numbers of birds were recorded in Cork, Kerry and Donegal (Gray *et al.* 2003).

6.2 Chough is amber listed on the Birds of Conservation Concern in Ireland (Colhoun and Cummins, 2013). This classification is based on the fact that the species conservation status has been listed as unfavourable on the Species of European Conservation Concern (SPEC). Chough are listed as SPEC 3 where SPEC 3 species are those for which the global population is concentrated outside Europe.

6.3 Winter counts made from 2001 and 2004 indicate that Trawbreaga Bay supports 100 Chough. This exceeds the All-Ireland 1 percent threshold for this species and so makes the site of national importance for Chough NPWS (2014a).

6.4 Chough is listed on Annex I of the EU Birds Directive 2009/147/EC.

Distribution of Chough in Trawbreaga Bay

6.5 Trawbreaga Bay SPA contains coastal habitats used by Chough. Nest sites have been recorded in the past at the northern end of the site. However, the main importance of this SPA to Chough conservation is that it contains an important foraging resource centred on the dune system at Lagg, and parts of the coastal slope that support coastal heath and maritime grassland. These areas are used by recently fledged young and others particularly during the autumn period. Furthermore, the coastal cliffs contains a regularly-used communal roost site (NPWS, 2014a).

Response of Chough to oyster trestles

6.6 While Chough are not known to associate with oyster trestles; equally they are rarely found to use the lower parts of the shore where oyster trestles are normally located. Use of the upper shore tends to be restricted to feeding on invertebrates associated with rotting seaweeds thrown up on the beach.

Impact Assessment - Chough

6.7 The Chough is a species of crow frequenting coastal areas from Wexford to Donegal; they are largely cliff nesting, though some birds will nest in man-made structures (Gray *et al.* 2003; Balmer *et al.* 2013). They frequent coastal habitats including areas of pasture and thus are at risk from changes in agricultural practices. In Ireland the 2007-11 Atlas (Balmer *et al.* 2013) indicates that

there has been an overall winter range expansion of 10% since the 1981-84 Atlas (Lack, 1986); while the breeding range has increased 4% since 1968-72 (Sharrock, 1976) and 2% since 1988-91 (Gibbon *et al*, 1993). While they may feed on insects associating with rotting algae on the upper shore, they generally do not use intertidal habitats. However, foraging along wrack deposits on the strandline is not commonly recorded on Donegal; when recorded it is possibly linked to frosty spells (M. Trewby, pers. comm; P. O' Donoghue, pers obs. in Co. Cork). We are not aware of any evidence that Chough interact with oyster trestles.

6.8 Some of the largest Chough flocks in Ireland have been recorded in dune systems at Lagg north of Trawbreaga Bay (Trewby *et al.* 2006). Trewby *et al.* (2006) state that 15 breeding pairs were recorded on a 70km stretch of coast on the Inishowen peninsula during the 2003 survey. In addition, a ca. 100 bird autumn flock was recorded in Lagg during the 2004/2005 survey. Furthermore, 100 birds were also recorded in the Lagg area from a separate observation in 2000 suggesting that this area has been an important Chough area for an extended period of time (R. Sheppard pers. comm. cited in Trewby *et al.* 2006).

6.9 The relatively low density of breeding pairs on Inishowen and the disproportionately high number of birds seen in the dunes at Lagg suggests this area and the associated roost at Five Fingers have a wider regional significance with these dunes assumed to be attracting birds from a wider area (Trewby *et al.* 2006).

6.10 Trewby *et al.* (2006) also observed that dune systems exhibiting a diversity of habitats and land use will provide a mosaic of profitable foraging microhabitats for Choughs. This diversity of dune habitats and complexity in land uses tends to be more evident in large dune systems, such as at Lagg. Therefore, these larger dune systems will tend to be of higher conservation value to Choughs, when compared to smaller dune systems or dune systems that have become fragmented through development pressures. In addition, Trewby *et al.* (2006) suggest that such dune sites were important as autumn '*assembly points*' for young Choughs and birds from outside the area and these flocks may then go on to roost communally and feed as a flock in nearby habitats through the winter. A similar pattern of use was observed at Barley Cove, Co. Cork and Inch, Co. Kerry, where the flock usage of coastal dune habitat declines in the late autumn and birds chose to feed in improved and semi-improved pastures inland from the coastal roost site over the winter (Trewby *et al.* 2006).

6.11 As a result these communal roost may play an important role in the re-colonisation of the Co. Antrim coast where Chough numbers have shown declines during past surveys.

6.12 Overall, due to the proposed scale of oyster cultivation; the lack of any significant use of intertidal habitat by Chough; and the separation of proposed oyster cultivation from known foraging, roosting or nesting sites it is unlikely that the intertidal oyster would have a negative impact on Chough using Trawbreaga Bay SPA.

Barnacle Goose

Status of Barnacle Goose

6.13 The Greenland breeding population of Barnacle Geese that over winter in Ireland and Britain is increasing (Mitchell *et al.* 2008) with a total wintering population estimated at 80,670 birds (Mitchell and Hall, 2013). This figure is based on the results of the most recent census which found that 31 sites of 72 checked in Ireland held 17,500 in 2013 (Crowe *et al.* 2014) while in Scotland, the equivalent survey yielded 63,170 geese from 38 of 224 sites checked (Mitchell and Hall, 2013). This represents a total wintering population increase of 14.4 percent since the last survey in 2008 (Mitchell and Hall, 2013 in Crowe *et al.*, 2014).

6.14 The results of the most recent census suggest that Ireland holds 22 percent of the flyway population and has shown an increase of 43 percent since the last census was undertaken in 2008 (Crowe *et al.* 2014). Over the long term, census results show a population increase from 2,771 in 1959/60 to 12,232 in 2008 (Walsh and Crowe, 2008; Mitchell *et al.* 2008) to 17,500 for the most recent survey (Crowe *et al.* 2014).

6.15 Notably, Mitchell and Hall (2013 in Crowe *et al.*, 2014) investigated the increases in population on a site by site basis and found that prior to the 2013 survey it appeared that increases in population were due to increases at a number of key sites in Ireland and Scotland, namely Islay, Tiree, Coll, Oronsay/Colonsay, South Walls, Inishkea Islands and Ballintemple/Lissadell which held the majority of geese (75.5% of the total in 2013); with Islay alone holding 55.7% of the population total. However, the recent census results suggest that numbers at key sites have stabilised since 2008 whereas number on the outlying sites continue to rise. This suggests that the key sites may have reached their carrying capacity and so outlying sites will continue to see an increase in numbers.

6.16 Internationally the population trend also shows an increasing trend (Wetland International, 2012). Notably, no sites in Northern Ireland record significant numbers of Barnacle Geese (Calbrade *et al.* 2010).

6.17 Barnacle Goose is amber listed on the Birds of Conservation Concern in Ireland (Colhoun and Cummins, 2013). Although population numbers are increasing for this species, it remains on the amber list of conservation concern as it has a localised wintering population, i.e. where 50 percent of the Irish population are located in 10 or fewer sites. The localised nature of the wintering groups makes them vulnerable; hence their inclusion on the amber list. In addition, the Irish population represents more than 20% of the European wintering population and so the species is considered to be of international importance and qualifies for the amber list.

6.18 In the UK, the Barnacle Goose is also listed as amber status on birds of conservation concern (Eaton *et al.* 2009) due to the localised nature of the wintering population with 50 percent of the UK population located in 10 or fewer sites.

6.19 In Ireland, the species is mainly recorded along the west and northwest coasts, often on islands or remote areas which are difficult to access. Internationally important numbers were recorded at Ballintemple in Co. Sligo, the Inishkea Islands off Co. Mayo and on Malin Head, Dunfanaghy New Lake and Trawbreaga Bay (all Co. Donegal) (Crowe *et al.* 2014). A number of additional sites along the west and northwest coast held nationally important numbers of Barnacle geese. The criteria to meet international importance are based on figures published by Mitchell and Hall (2013) and the threshold for national importance is based on the proportion of 17,500 individuals reported by Crowe *et al.* (2014) that occur at the individual sites.

6.20 Notably, no Barnacle Geese were recorded at Trawbreaga during the spring 2008 census. However, 317 birds were recorded at Malin Head. It is now thought that the flock at Malin Head and Trawbreaga Bay form one ecological unit (NPWS, 2014a) and may move between the sites.

Table 6.1 - Summary population data for Barnacle Goose at Trawbreaga Bay (after NPWS, 2014).

Survey	Numbers recorded
Baseline period from IWeBS (Mean Peak 1995/96 to 1999/00)	645 (I)
1999 Spring census	217 (N)
2003 Spring census	254 (N)
2008 Spring census *	317 (N)
2010 November IWeBS ground census	668 (N)
2013 Land based Spring census (Trawbreaga)	890 (I)
2013 Land based Spring census (Malin Head)	1,800 (I)
Incidental records (www.irishbirding.com) - Near Malin Town (18th Feb 2015) - Between Malin & Malin Head (14th Oct 2014)	 ca. 2,000 2,500
(N) All Ireland 1% importance threshold: 150 (Crowe and Holt, 2013) (I) Based on Wetlands International, 2006 for baseline period and 2012 thresholds for recent counts * peak count of Malin Head flock using aerial count	

6.21 The population trend for Barnacle Goose presented in NPWS (2014a) is calculated using IWeBS data and is based on the change between the baseline period (mean 1995/96 to 1999/00) and recent counts (mean 2007/08 to 2009/10). A mean number of 645 individuals were recorded for the baseline period with a mean number of 1,421 recorded from the recent period. This represents a 120 percent increase in numbers at Trawbreaga Bay. As a result, the site conservation condition for Barnacle Goose at Trawbreaga Bay SPA has been assessed as favourable based on the increasing population (NPWS, 2014a).

6.22 During the NPWS baseline waterbird survey in 2009/2010, a peak count of 2194 Barnacle Geese was recorded in Trawbreaga Bay during the November low tide count. The average number of Barnacle Geese recorded during low tide counts was 714.

6.23 Barnacle Geese utilising sites at Lissadell and Ballintemple in Drumcliff Bay, Co. Sligo, the Inishkea Islands, Co. Mayo and Rathlin O' Birne Island, Co. Donegal show consistent site usage. In other locations, site usage is less consistent and may depend on food availability, disturbance and weather conditions through the winter (Boland and Crowe, 2012). The inconsistency in numbers recorded from surveys indicates that flocks are highly mobile through the winter (Boland and Crowe, 2012). In the case of Trawbreaga, the Trawbreaga flock would appear to be closely linked with the wider Malin flock and should be considered as a single unit. Barnacle Goose is not a qualifying interest of the neighbouring Malin Head SPA (designated solely for Corncrake).

6.24 The species is primarily a land-based bird, foraging terrestrially while roosting can occur on sandbanks, saltmarsh and offshore islands (NPWS, 2014a). Glashedy Island is often used as a roost when disturbance levels are high in Trawbreaga Bay and as an overnight roost.

Other SPAs

6.25 As noted above Barnacle Goose is also a qualifying interest of Inishtrahull SPA, Horn Head to Fanad Head SPA and Greers Isle SPA (see Table 4.2).

- The island of Inishtrahull is located 12.5km northeast of Malin Head. The site is known to occasionally support Barnacle Geese – 153 in spring of 1993; 69 in spring of 1994. The NPWS site synopsis assigns these birds to the population that frequents Trawbreaga Bay (NPWS site synopsis, 2006). It notes that the island provides a useful feeding site and a safe refuge. However, at 12.5km offshore this would be on the outer margin of recorded daily foraging – roost site commutes for Barnacle Geese (Johnson *et al.*, 2014). The timing of the records suggests use of the island by spring migrants. Inistrahull is not listed in the 2008 or 2013 surveys (Crowe *et al.*, 2014).

- Both Greenland White-fronted Geese and Barnacle Geese are recorded from Horn Head to Fanad Head SPA. They favour New Lake near Dunfanaghy (196 and 160, respectively; averages 1995/96-1999/00); this site is just over 40km to the southwest of Trawbreaga. There's no evidence of Greenland White-fronted Geese using Trawbreaga. In the 2013 census Dunfanaghy New Lake supported 1,215 Barnacle Geese.

- As noted, while Malin Head is not listed for Barnacle Geese it supported 1,800 birds in 2013 (i.e. a 311.9% population change since 2008) (Crowe *et al.*, 2014).

Table 6.2 - Summary population data for Barnacle Goose at Trawbreaga Bay & Environs (after Crowe *et al.*, 2014).

Site - 2013 Census	SPA	Numbers recorded
Inistrahull	Inistrahull SPA	n/a
Dunfanaghy New Lake	Horn Head to Fanad Head SPA	1,215
Trawbreaga	Trawbreaga Bay SPA	890
Malin Head	-	1,800

Notes: n/v – site not visited; n.a. – site visited, but no geese recorded.

6.26 It would therefore appear that Trawbreaga / Malin supports ca. 2,500 – 3,000 Barnacle Geese; with a further ca. 1,200 to the west at Dunfanaghy New Lake. It is not known to what extent there is interchange between these colonies or with sites further to the west; though some interchange with Islay, Scotland is known to occur (NPWS, pers. comm.). Further west 232 birds were recorded in 2013 from Inishbofin, Inishdooey & Inishbeg SPA; with a further 318 from Inishsirrer within West Donegal Islands SPA. Numbers at Inishsirrer are also increasing – 62.2% since 2008 (no figure is available for Inishbofin, Inishdooey & Inishbeg). To the east there are no SPAs in Northern Ireland for which Barnacle Goose is a qualifying interest. A colour-ringing scheme would be required to fully understand patterns of movement between these sites to determine if they act as separate populations or not; e.g. is the increase in numbers of these other sites been driven by growth and expansion of the Trawbreaga / Malin flock.

Distribution of Barnacle Goose in Trawbreaga Bay

6.27 Barnacle Geese are predominantly terrestrial grazers and forage within coastal grassland and saltmarshes. During the NPWS baseline waterbird survey at Trawbreaga Bay, Barnacle Geese were predominantly recorded foraging terrestrially along the west and south shores of the bay, and used terrestrial habitats in all subsites except the back strand (0A443). In addition, flocks of 20 and 60 birds were recorded roosting in the intertidal area at the southeast of the bay (0A440) on two separate low tide counts.

6.28 Notably, the areas of terrestrial grassland in which the flocks were recorded are largely outside the SPA boundary (NPWS, 2014a). Figure 6.1 shows the distribution of flocks recorded during the baseline waterbird survey. In addition to observations of foraging birds, two observations of roosting geese in the intertidal area were made during the baseline waterbird survey in the southeast of Trawbreaga Bay. In general, Barnacle Geese have been observed to forage terrestrially during the day and to fly out to Glashedy Island to roost at night; although it appears that the intertidal flats can also be used as a daytime roost site.

6.29 As the winter of 2009/2010 was exceptionally cold the prevailing weather could influence bird behaviour compared to behaviour under average winter conditions; additional information was provided by Emmett Johnston (NPWS conservation ranger for Inishowen) in the form of bird usage maps for Trawbreaga Bay (Figure 6.2) as well as sketch maps showing important Barnacle Geese areas in the bay based on personal observations (Figure 6.3).

6.30 The flock usage maps show a similar pattern with the largest flocks of geese recorded consistently in habitats along the southeast, south and west shore of the bay (including areas of terrestrial, intertidal and / or saltmarsh habitat). These flock maps show usage of the intertidal areas of southern Trawbreaga Bay by Barnacle geese, presumably roosting in the areas (also noted in consultation with NPWS). In all cases the number using the intertidal area are low compared to the large flocks of geese that have been observed foraging in the surrounding fields. Large numbers were, however, observed feeding in a large field close to the shore at Magheranaul (flock size; 204-900). Aquaculture site T12/492 is located to the south and west; access is as shown on Figure 5.1 and 5.2. The shore and fields on the southern side of the bay, in the townland of Strath, are also noted as being of importance to Barnacle Geese (including records of flocks of 900-1700 birds) (Figure 6.1-6.3).

6.31 In summary; based on all of the information available, favoured terrestrial foraging habitats include the improved grassland fields south and west of Malin village and on improved grassland at the mouth of the River Straid. However, flocks have been recorded using the saltmarsh and improved grassland habitats along the southeast, south and southwest shores of Trawbreaga Bay. In addition, the geese have been observed roosting on the intertidal mudflats particularly in the southern side of the bay, adjacent to the foraging habitats.

6.32 Prior to and including IWeBS surveys in 2008/2009, Trawbreaga Bay was not divided into subsites. As a result no spatial information is available even at the coarse scale of subsite. Following the baseline waterbird survey, subsequent IWeBS counts were made using a set of subsite boundaries (see note on differences above). However, Barnacle Geese have only been recorded on 4 partial IWeBS counts that have been undertaken since the baseline waterbird survey thereby limiting the value to which IWeBS data can inform Barnacle Goose distribution across Trawbreaga Bay. For the counts made, Barnacle Geese were recorded on two occasions in subsite 0A438 (Southwest inlet) and once in subsite 0A442 (North central). It should be noted though that IWeBS counts target high tide; whereas Barnacle Geese appear to use the flats as a low tide roost.

Response of Barnacle Goose to oyster trestles

6.33 We are not aware of any published information on the response of Barnacle Geese to oyster trestles. Given that Barnacle Geese now predominantly feed on improved grassland, creation of trestles would not result in any direct loss of foraging grounds. Disturbance due to access to the foreshore could disturb birds feeding in coastal fields; while there is also evidence of Barnacle Geese roosting on the intertidal flats at low tide. These birds could also be disturbed by site workers.

Impact Assessment – Barnacle Goose

6.34 As noted Barnacle Geese favour feeding in terrestrial habitats. One of the preferred foraging areas is located in the coastal fields south and west of Malin (E. Johnston pers comm; see Figure 6.1-6.3). This is located just to the east of the main line of trestles; a significant proportion of which are currently licenced. The majority of new applications involve extension to the northwest or outwards into the bay (along the southwestern side of the existing line of trestles). Figure 6.3 illustrates the area of fields and adjoining shore generally favoured by Barnacle Geese (E. Johnston pers comm); broadly speaking the proposed licencing and extensions would not alter the profile of trestles experienced by birds feeding in and around Malin. While the increased number / density of trestles would no doubt increase the level of activity on the foreshore it is likely that field feeding geese will adapt to this.

6.35 Access to these northerly blocks is from the R242 Lagg Road approximately 1km further to the west of the favoured fields (Figure 6.3). The favoured fields experience disturbance from road traffic, but are isolated from houses, farmyards etc. Appropriate screening of a proposed works areas / sheds and use of this access, which is located on the edge of an existing cluster of houses, at a distance from the preferred fields, should not therefore affect continued use of favoured fields close to Malin (refer to conditions / monitoring proposals below; see also Marchant, 2014).

6.36 There are no proposals to place trestles along the southern shoreline – along which Barnacle Geese are known to forage in large numbers (Figure 6.1 & 6.2). There is, however, a proposed access point from the minor road leading to Glassagh Point to trestles mid-estuary (in subsite 0A439). While Barnacle Geese are known to roost intertidally in this area; as shown in Figure 6.3 there are existing trestles mid-estuary and the recorded size of roosting flocks tends to be low relative to the total numbers using Trawbreaga as a whole. By far the largest flocks are recorded from Strath (57-204 & 900-1700); Magheranaul (204-900); eastern tip of Glassagh Point (204-900) and Moanreallagh Point (south of Malin; 204-900). Fields to the west of the access road to Glassagh Point (and adjoining shore) are also noted to be important (E. Johnston pers comm). However, as evidenced by use of the fields west of Malin geese can and do habituate to road traffic along such roads.

6.37 The other main block of trestles would be located off Magheranaul; in this case the majority of licences are new applications. An access point is proposed from a minor road leading down to the shore at the western end of the trestles. While Figure 6.3 does not highlight this as a key area, the 2007/08 and 2009/10 surveys (Figure 6.1 & 6.2) did record sizeable numbers feeding close to the proposed access point. It is difficult to predict how usage of the fields closest to the access lane would be affected, though it should be noted that this area is already close to a number of houses and farmyards and so would be exposed to a certain level of human activity.

6.38 Key feeding areas to the southwest are unlikely to be impacted (refer to conditions / monitoring proposals below).

6.39 In summary, Barnacle Geese numbers are increasing in Trawbreaga; while they have clearly favoured sites it's probable that geese respond to human pressures / disturbance by moving between favoured feeding grounds around the bay (and indeed beyond to Malin) in response both to disturbance and changing patterns of food availability / needs during the winter. Areas around the eastern and southern parts of the bay should remain largely unaffected by disturbance (due to the location and proposed scale of production in these areas). There may be some displacement of birds roosting intertidally; however, there is sufficient space within the estuary to accommodate a limited increase in disturbance.

6.40 In contrast, disturbance of geese using Magheranaul / Strath in the southwestern extension of Trawbreaga Bay will be influenced by both the location of different aquaculture sites and the scale

of proposed on site operations (i.e. number of workers / days on the shoreline). Sites located to the east of the proposed access point (Figure 5.1 and 5.2) run eastwards towards Fegart Point; i.e. away from (and progressively screened from) areas highlighted as being used by geese at Magheranaul / Strath. Disturbance in these areas is not likely to be significant; though as noted in previous assessments no dogs are to be allowed on site; machinery are to be well maintained to avoid unnecessary noise; and no bird scaring devices are to be used on site.

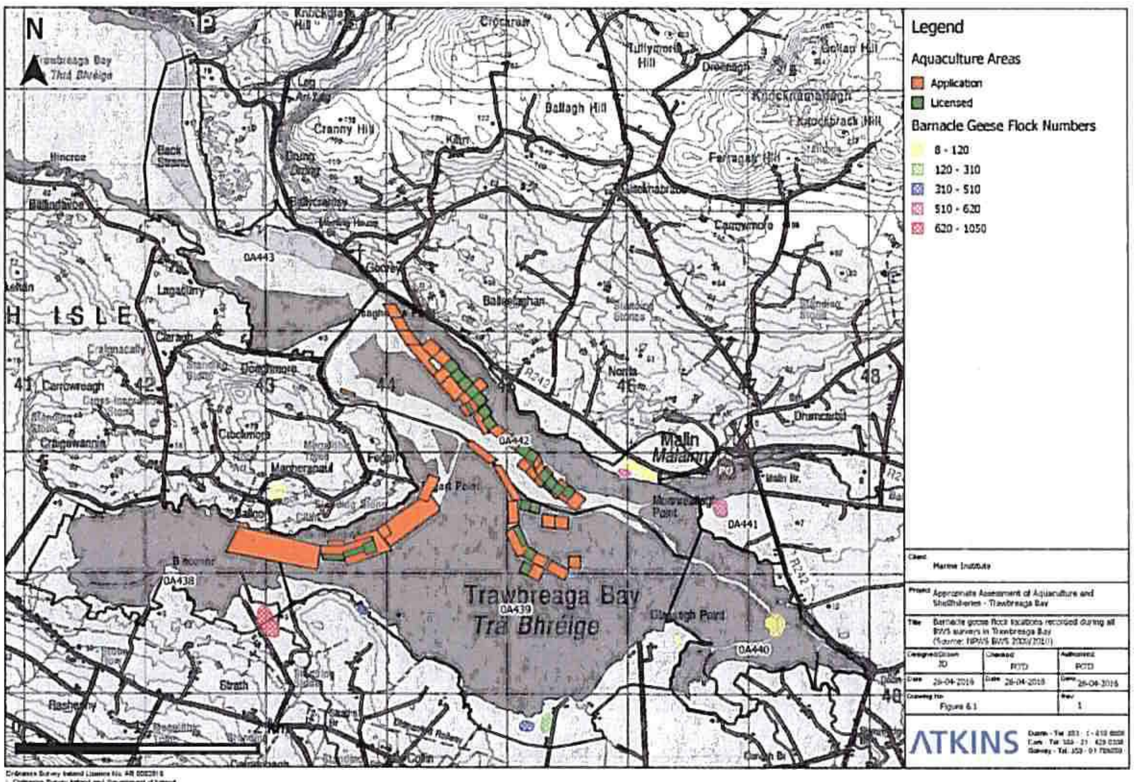
6.41 In contrast, aquaculture site T12/492, located to the west of the access, is both much larger in scale (15.575 ha) and is located close to areas highlighted as being used by geese at Magheranaul / Strath (Figure 5.1 & 5.2). Disturbance of geese at this location cannot be fully discounted. However, the we understand that site T12/492) is intended only as a nursery area for seed oyster; it will only be accessed three times in the year by a maximum of two workers and therefore, based on the level of activity proposed, it does not represent a significant source of disturbance. Any change in proposed levels of on-site activity would need to be reconsidered.

6.42 However, it is also noted that aquaculture site T12/492 extends across the subtidal channel entering the southwestern extension of Trawbreaga Bay as well as much of the bay opening. Impacts on patterns of tidal flow and patterns of erosion and deposition cannot therefore be discounted. As noted above, Trawbreaga Bay is also designated for Wetland and Waterbirds [A999] (pg. 3.6-3.7). The conservation objective for wetlands in Trawbreaga Bay SPA is to "*maintain the favourable conservation condition of the wetland habitat in Trawbreaga Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it*" (NPWS, 2014b). This bay is dominated by *muddy sand to coarse sediment with* Pygospio elegans *community complex* along with a smaller area of *Sand with* Angulus tenuis *and* Scoloplos armiger *community complex* (Figure 2.5); along with areas of saltmarsh. These also lie with the North Inishowen Coast SAC (002012); a full assessment of impacts on marine habitats is presented in the accompanying appropriate assessment of aquaculture in the North Inishowen Coast SAC (002012) (Marine Institute, 2016)

6.43 We understand that NPWS monitor geese annually at Trawbreaga Bay; it should be a condition of any expansion in oyster cultivation that this continue. This should focus in particular on whether geese continue to use Trawbreaga Bay in line with expectations; e.g. that access from Lagg Road, Magheranaul and Glassagh Point does not impact on patterns of site use by geese in these areas and that activities do not displace birds from Magheranaul / Strath. Furthermore, any use of a proposed works areas / sheds off Lagg Road must also be undertaken in such a way as not to disturb birds using fields to the southwest of Malin.

6.44 It should also be a condition of planning that no dogs are allowed when accessing the foreshore to avoid disturbing geese; and that vehicles must be maintained in sound working order to prevent excessive noise disturbance and that no bird scaring devices are to be used on site.

6.45 While, based on the current proposals, the risk of negative disturbance impacts is low, development of a clear Code of Practice; close consultation with NPWS and continuation of annual monitoring of Barnacle Geese is recommended to identify and address any disturbance issues that might arise (with particular emphasis on the areas around the Magheranaul and Glassagh Point access points (Figure 5.1).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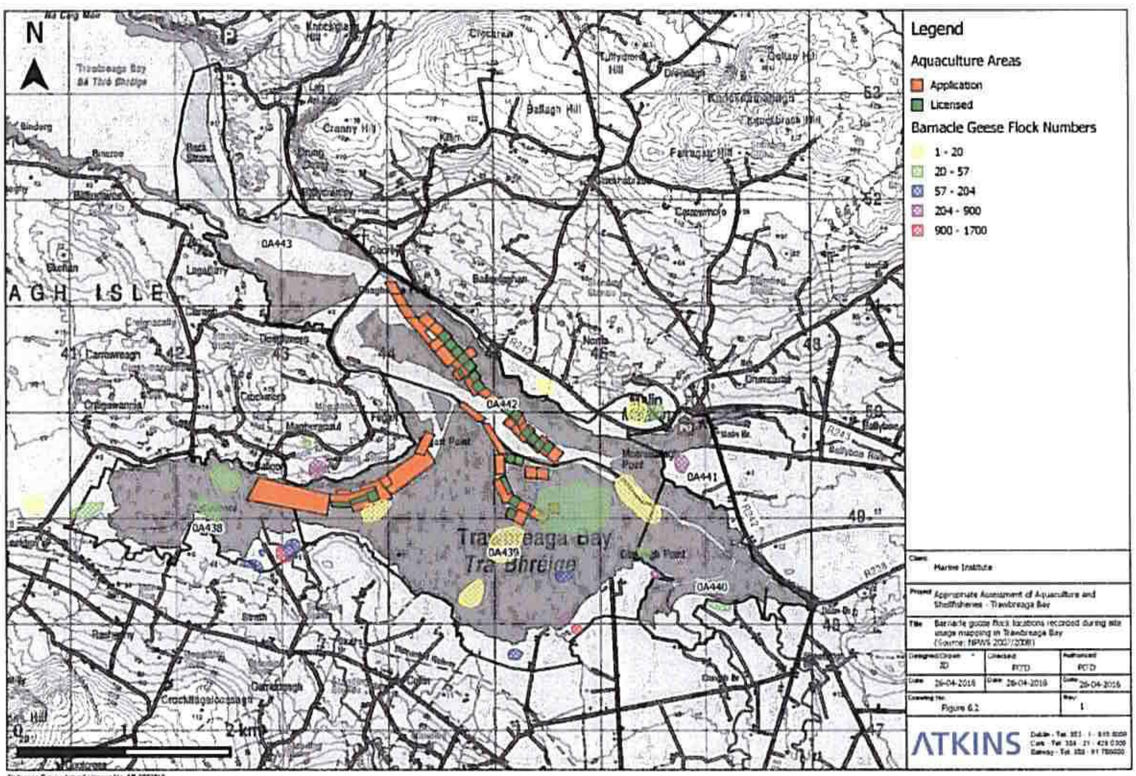
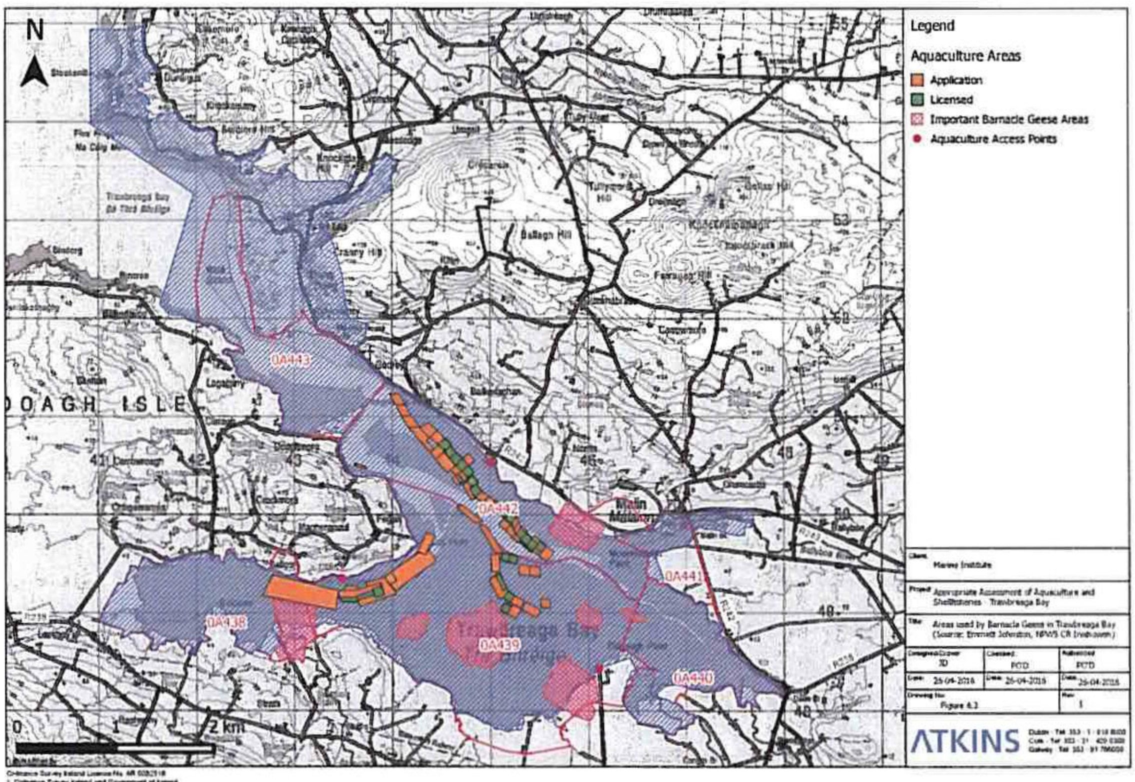
Trawbreaga Bay
Trá Bhréige
Legend
Aquaculture Areas
Application
Licensed
Barnacle Geese Flock Numbers
8 - 120
120 - 310
310 - 510
510 - 620
620 - 1050
Client
Marine Institute
Project
Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Drawing No
Figure 6.1
ATKINS
Malin
Ballagh Hill
Cranny Hill
Crockraw
OA443
OA442
OA441
OA440
OA439
OA438
R242


N
Legend
Aquaculture Areas
Application
Licensed
Barnacle Geese Flock Numbers
1 - 20
20 - 57
57 - 204
204 - 900
900 - 1700
Trawbreaga Bay
Tra Bhréige
OA443
OA442
OA441
OA438
OA439
OA440
Ballagh Hill
Cranny Hill
Malin
0
1
2 km
Client Marine Institute
Project Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Title Barnacle goose flock locations recorded during site usage mapping in Trawbreaga Bay (Source: NPWS 2007/2008)
Designed/Drawn JD
Checked RTD
Authorised RTD
Date 26-04-2016
Date 26-04-2016
Date 26-04-2016
Drawing No. Figure 6.2
Rev 1
ATKINS


Legend
Aquaculture Areas
Application
Licensed
Important Barnacle Geese Areas
Aquaculture Access Points
Marine Institute
Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Areas used by Barnacle Geese in Trawbreaga Bay
26-04-2016
Figure 4.3
ATKINS
OA443
OA442
OA441
OA438
OA439
OA440
Trawbreaga Bay
DOAGH ISLE
Ballagh Hill
Malin
2 km

Light-bellied Brent Goose

Status of Light-bellied Brent Goose

6.46 The *hrota* population of Light-bellied Brent Geese that over winter in Ireland and breed in the Canadian high Arctic have shown increases in population since the early 1990's (Boland and Crowe, 2012) with a peak population estimate of 39,000 in 2007 (Hall and Colhoun, 2007 in Boland and Crowe, 2012). The population has been calculated to be increasing at an annual rate of 5.1 percent overall (Boland and Crowe, 2012). Internationally, the population trend also shows increases (Wetland International, 2012).

6.47 The site population trend for Light-bellied Brent Goose at Trawbreaga Bay published in NPWS (2014a) is calculated using IWeBS data and is based on the change between the baseline period (mean 1995/96 to 1999/00) and recent counts (mean 2007/08 to 2008/09). A mean number of 362 individuals were recorded for the baseline period with a mean number of 366 recorded from the recent period (2-yr mean 2007/2008 – 2008/2009). This represents a 1 percent increase in numbers at Trawbreaga Bay. As a result, the site conservation condition for Light-bellied Brent Goose at Trawbreaga Bay SPA has been assessed as favourable based on the increasing population (NPWS, 2014a).

6.48 During the NPWS baseline waterbird survey in 2009/2010, a peak count of 429 Light-bellied Brent Geese was recorded in Trawbreaga Bay during the November count. This met the threshold for numbers of international importance. The average number of Light-bellied Brent Geese recorded during low tide counts was 228; though birds tend to be widely scattered and / or field feeding at low tide.

6.49 Light-bellied Brent Goose is categorised as amber listed on the Birds of Conservation Concern in Ireland (Colhoun and Cummins, 2013). This classification is based on the fact that the species conservation status has been listed as unfavourable on the Species of European Conservation Concern (SPEC). Light-bellied Brent Geese are listed as SPEC 3 where SPEC 3 species are those for which the global population is concentrated outside Europe. In addition, further attributes contributing to the amber list status includes the fact that Brent Geese has a localised wintering population, i.e. where 50 percent of the Irish population are located in 10 or fewer sites. The localised nature of the wintering groups makes them vulnerable and are so included on the amber list. In addition, the Irish population represents more than 20% of the European wintering population and so the species is considered to be of international importance and so qualifies for the amber list.

6.50 In the UK, Brent Geese are classified as amber conservation concern for the same reasons as those outlined above in Ireland.

6.51 Brent Geese are grazers and are known for their preference for foraging in intertidal areas with the Eelgrass, *Zostera* sp. (Robinson *et al.* 2004). Brent geese will also feed upon algae species, saltmarsh plants and will also utilise terrestrial grazing habitats such as improved grassland, parkland, etc. (NPWS, 2014a). Within Trawbreaga Bay small areas of *Zostera dominated community* are located at the southern end of the bay (in the environs of Glassagh Point) (NPWS, 2014e).

Distribution of Light-bellied Brent Goose in Trawbreaga Bay

6.52 Light-bellied Brent Geese were recorded in all but one subsite (0A441 – Malin) during the NPWS baseline waterbird surveys. Intertidal foraging was recorded within five subsites overall: 0A438, 0A439, 0A440, 0A442 and 0A443 (NPWS, 2014a). Brent Geese were recorded most frequently in subsite 0A443 (Northwest) with geese present during all low tide counts. In addition this subsite held the highest mean number of Brent Geese across all low tide counts (there are no aquaculture sites proposed in 0A443). The other two subsites where Brent Geese were consistently recorded across the low tide counts were 0A439 (Trawbreaga South) and 0A442 (North central). These two subsites also held high peak and mean numbers of Brent Geese.

Table 6.3 - Peak and mean counts and percentage occupancy of subsites where Brent Geese were recorded during low tide surveys for the NPWS baseline waterbird survey.

Subsite	LT Subsite Peak Count	LT Subsite Mean Count	LT subsite % occupancy
0A438	39	11	33
0A439	158	69	83
0A440	72	13	50
0A442	156	65	67
0A443	115	70	100

6.53 The position of Light-bellied Brent Geese flocks recorded during the NPWS baseline waterbird survey are presented in Figure 6.4. This shows that Brent Geese were consistently recorded at a number of locations in Trawbreaga Bay including the shoreline area south of the sand dunes at the back strand to the Meeting house bridge (0A443); another location is the intertidal sand and mud flats inside Doaghmore Point as far south as Malin (including around the existing aquaculture licenced areas) (0A442). Brent Geese were frequently recorded north of Glassagh Point and also further west, southeast of Doagh Isle (again around the area of existing aquaculture). Small numbers were also located in the southwestern bay (0A438).

6.54 The patterns of flock distribution from the NPWS baseline waterbird survey are further supported by maps showing the important areas for Brent Geese in Trawbreaga Bay provided by Emmett Johnston (NPWS conservation ranger for Inishowen), which show the areas on both sides of the tidal channel inside the mouth of the bay to be important. In addition, an area of the foreshore west of Malin has been identified as important along with intertidal and terrestrial habitats east and west of Glassagh Point (Figure 6.5).

6.55 These patterns of Brent Goose distribution are supported by additional information from site usage mapping by NPWS in 2007/2008 which again show high frequency of occurrence on the intertidal sand and mud flats on either side of the tidal channel inside the mouth of the bay, around the estuary of Ballyboe River at Malin (usage of these habitats were not recorded by NPWS baseline waterbird survey flock maps) and broadly on the intertidal sand and mud flats northeast of Glassagh Point (Figure 6.6).

6.56 Prior to and including IWeBS surveys in 2008/2009, Trawbreaga Bay was not divided into subsites. Following the baseline waterbird survey, subsequent IWeBS counts were made using a set of subsite boundaries (see note on differences above). However, Brent Geese have only been recorded on 2 partial IWeBS counts that have been undertaken in Trawbreaga Bay since the baseline waterbird survey thereby limiting the value to which IWeBS data can inform Barnacle Goose distribution across Trawbreaga Bay. For the counts made in November 2010 and 2012,

Brent Geese were recorded in subsite 0A443 (Northwest) on both occasions with one count of 68 and another high count of 573 birds.

Response of Light-bellied Brent Goose to oyster trestles

6.57 The trestle study (Gittings and O' Donoghue, 2012) concluded that Light-bellied Brent Goose showed a variable response to oyster trestles: at some sites observed numbers within the oyster trestle blocks were broadly in line with predicted numbers, while at other sites the observed numbers were generally lower than the predicted numbers. Differences between sites may reflect differences in the management of the trestles: the geese feed on algae attached to the trestles so more intensive management may reduce the food availability. There are also likely to be seasonal differences in the pattern of usage of the trestles, as algal cover of the trestles will be highest in the autumn and will gradually decline over the winter. The fieldwork for the trestle study was carried out during the late winter period, so the results of this study may underestimate Light-bellied Brent Goose usage of areas occupied by trestles. We also have some anecdotal evidence that Light-bellied Brent Goose may be more sensitive to disturbance than other waterbird species, so the intensity of husbandry activity relative to the area occupied by the trestles may affect the patterns of usage.

6.58 In recent work at Donegal Bay (Gittings and O'Donoghue, 2013b), Light-bellied Brent Goose flock distribution within trestle blocks broadly corresponded to the distribution of trestle blocks with high algal cover, and the timing of their occurrence corresponded to times when no tractors were present within the trestle blocks. However, this timing pattern could, alternatively, be explained by an association with times when the tide is flooding/ebbing over the trestle blocks, making it easier for the geese to graze on the algae, which is lifted by the tide. Other anecdotal evidence in support of a disturbance factor being important includes the fact that at one of the sites (Ballymacoda Bay) in the trestle study where Light-bellied Brent Goose generally showed a negative response, the one day on which observed numbers were higher than predicted numbers was the only day on which there were no husbandry activity. Another supporting observation is that on a visit to Dungarvan Harbour on 17th March 2013, an exceptional count of 690 Light-bellied Brent Goose within the trestle blocks was recorded (T. Gittings, unpublished data); there was no husbandry activity taking place on this bank holiday.

Impact Assessment – Light-bellied Brent Goose

6.59 As noted site usage maps are presented in Figure 6.4 (NPWS baseline waterbird survey, 2009/2010); Figure 6.5 (summary of sites used; E. Johnston, NPWS) and Figure 6.6 (locations recorded during site usage mapping in 2007/2008).

6.60 Of the subsites listed in Table 6.3 there are no trestles proposed for 0A440 and 0A443 (peak counts 72 and 115, respectively). Currently, the main concentration of trestles is on 0A442 (peak count 156) and 0A439 (peak count 158); these subsites currently support in and around half of the Light-bellied Brent Geese using Trawbreaga. The percentage of birds recorded during NPWS baseline waterbird counts is shown in Table 6.4. Subsites 0A439 and 0A442 account for ca. 50-60% of birds; though on occasion over 60% of birds were observed in one of 0A439, 0A442 or 0A443 in a single count.

Table 6.4 - Percentage of Brent geese recorded within each subsite across LT, HT and combined LT and HT counts during BWS.

Subsite	% of low tide count records	% of high tide count records	% of LT and HT records
0A438	5	14	7
0A439	30	32	31
0A440	6	19	9
0A442	29	20	27
0A443	31	14	27

6.61 The area 0A439 and 0A442; the area of intertidal habitat and the % of intertidal habitat under aquaculture / subsite is presented in Table 6.5. As noted, impacts that will cause displacement of 5% or more of the total SPA population of a non-breeding SCI species (for each site) have been assessed as potentially having a significant negative impact and thus require further study in the context of species behaviour; relationship with aquaculture types; population trends etc. The current and proposed location of trestles with respect to Light-bellied Brent Geese behaviour and feeding ecology is therefore considered below.

Table 6.5 – relationship between subsite size, area of intertidal habitat and potential displacement of Light-bellied Brent Geese.

Subsite	Area of subsite (ha)	Area of intertidal habitat per subsite (ha)	Area of intertidal habitat covered by aquaculture sites (ha)	% intertidal habitat under aquaculture / subsite	% of low tide count records	Average displacement of birds
0A438	143.4	106.8	7.48	7.0%	5%	0.35%
0A439	493.2	395.42	35.17	8.9%	30%	2.67%
0A442	215.0	105.38	9.8	9.3%	29%	2.69%
					Cumulative Displacement	5.71%

6.62 Figures 6.4-6.6, which summarise site usage, suggests that the shoreline at Magheranaul is not favoured by significant numbers of Light-bellied Brent Geese. While eastward extension towards Fegart does bring site activities and associated disturbance closer to favoured areas off Fegart Point, such areas are already subject to disturbance from existing trestles. Small numbers of birds (i.e. 16-33) use the western end of 0A439 where T12/492 would be located. While no trestles are proposed along the southern shore of 0A439 it is proposed to access mid-estuary trestles from a local road at Glassagh Point; as shown in Figure 6.4 good numbers of birds were recorded in the NPWS baseline waterbird survey north and west of Glassagh Point.

6.63 In 0A442 it is proposed to infill and extend to the northwest and in some areas extend further out into the bay. There is no proposal for infilling back towards the shore; though the increased level of on site maintenance may result in displacement of birds foraging at low tide along the shoreline when works are ongoing on the trestles. As shown in Figure 6.4 the shoreline south from Back Strand (0A443) to Malin (through 0A442) supports Light-bellied Brent Geese.

6.64 The body of evidence collected in recent years clearly demonstrates that Light-bellied Brent Geese can and do forage on green algae growing on trestles and oyster bags. While it is also clear feeding geese are displaced during on site maintenance works; these activities occur at low tide, whereas it appears that feeding on trestles is when the tide is flooding/ebbing over the trestle blocks, making it easier for the geese to graze on the algae, which is lifted by the tide. Furthermore, following displacement birds will move back to forage quiet quickly following cessation of the disturbing activity. What is less clear is whether birds foraging along the shoreline

behind trestles (i.e. from Goorey south through Balleelaghan) would also be displaced during on site maintenance works due to the proximity of the trestles to the shoreline (particularly those adjacent to Goorey which come to within 30m of the shoreline). Figure 6.4-6.6, however, does not suggest that this area is favoured by Light-bellied Brent Geese; with shoreline areas to the north in subsite 0A443 and around Malin to the east recording more significant numbers. In reality displacement of birds is therefore likely to be much less than 5%. While the risk of negative impacts is low, development of a clear Code of Practice; close consultation with NPWS and continuation of annual monitoring of Light-bellied Brent Geese is recommended to identify and address any disturbance issues that might arise.

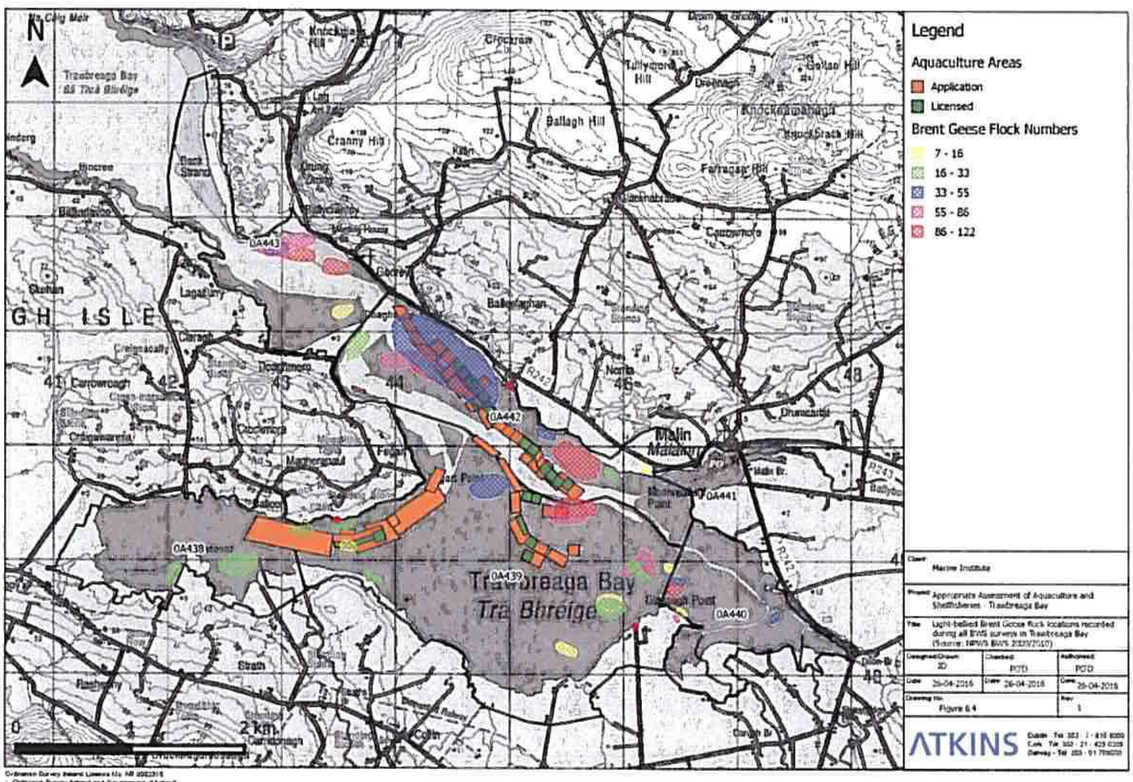
Wetlands

6.65 The Conservation Objectives define the favourable conservation condition of the wetlands SCI in the Trawbreaga Bay SPA purely in terms of habitat area.

6.66 None of the activities being assessed will cause any change in the permanent area occupied by wetland habitat. Therefore, the activities being assessed are not likely to have any significant impact on this SCI and it has been screened out from any further assessment.

Activity screening

6.67 The spatial patterns of occurrence of some of these species, and/or scientific evidence about the nature of their response to particular activities, may mean that potential impacts can be screened out without detailed analyses. However, for clarity this secondary screening is carried out in the individual sections of this assessment dealing with each activity.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33 - 55
55 - 86
86 - 122
Trawbreaga Bay
Trá Bhréige
Malin
Ballagh Hill
Cranny Hill
OA439
OA440
OA441
OA442
OA443
2 km
Client
Marine Institute
Title
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Drawing No.
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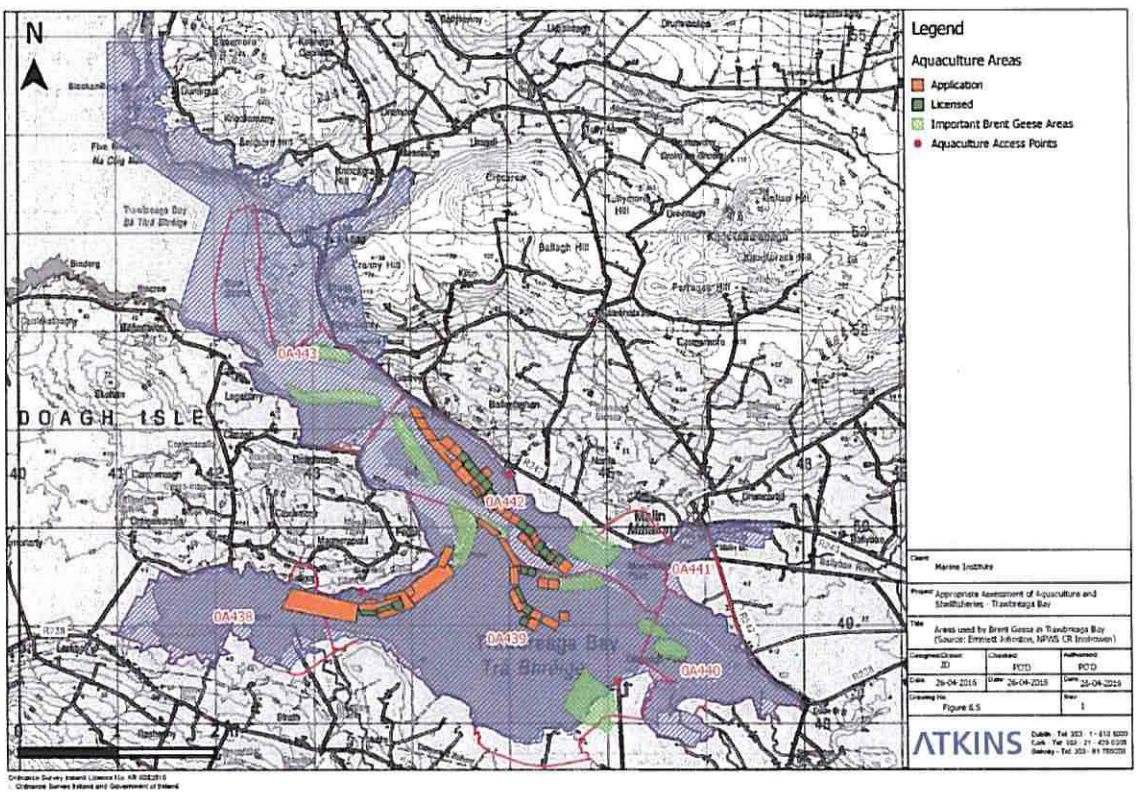
ATKINS


N
DOAGH ISLE
Trawbreaga Bay
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0A438
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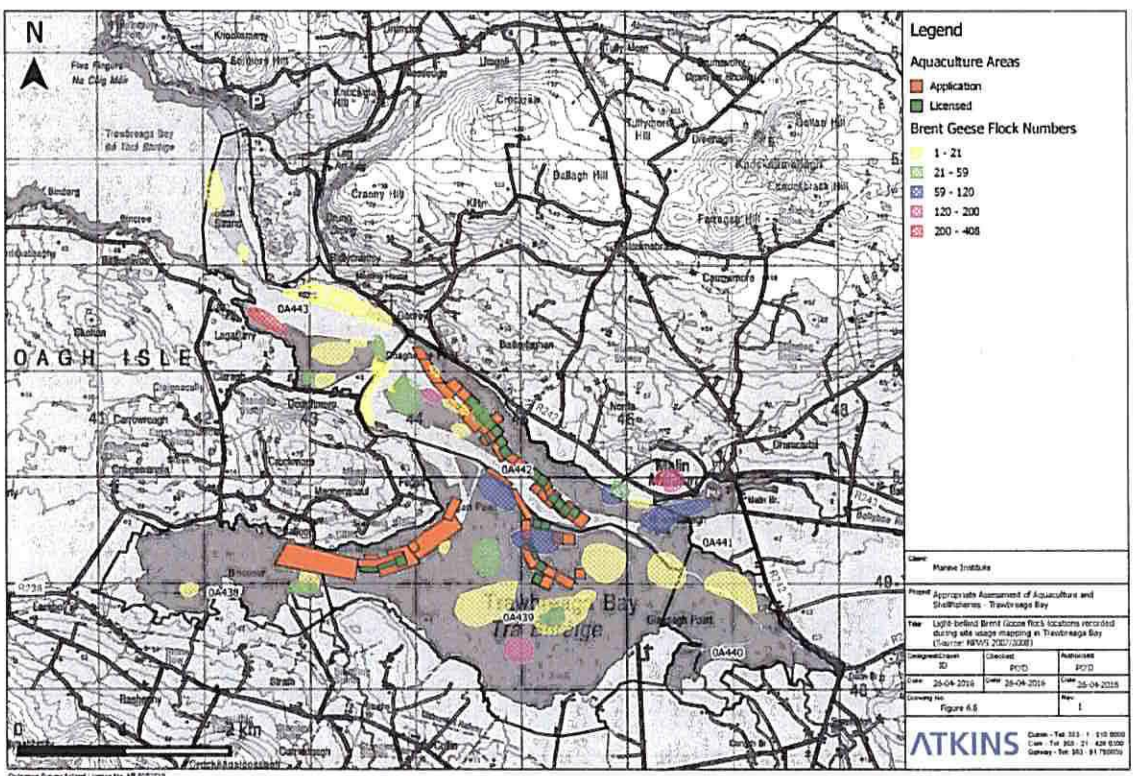
Legend
Aquaculture Areas
Application
Licensed
Important Brent Geese Areas
Aquaculture Access Points
Client
Marine Institute
Project
Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Title
Areas used by Brent Geese in Trawbreaga Bay (Source: Emmett Johnston, NPWS CR Irishtown)
Figure 6.5
ATKINS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Application
Licensed
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1 - 21
21 - 59
59 - 120
120 - 200
200 - 408
OA443
OA442
OA441
OA440
OA439
OA430
Trawbreaga Bay
Malin
2 km
Project: Appropriate Assessment of Aquaculture and Shellfisheries - Trawbreaga Bay
Title: Light-bellied Brent Goose flock locations recorded during site usage mapping in Trawbreaga Bay (Source: NPWS 2007/2008)
Checked: POD
Authorised: POD
Figure 4.6
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7. In-combination effects of aquaculture with other activities

Introduction

7.1 This section presents an assessment of potential cumulative impacts from the aquaculture and shellfish activities considered in this assessment in combination with other relevant activities that could potentially affect the SCI species.

Activities

Disturbance generating activities

7.2 Five different activities were recorded to cause disturbance to waterbirds during the NPWS baseline waterbird surveys in 2009/2010. These were walking (including with dogs), motorised vehicles, bait-digging, hand-gathering of molluscs and activities associated with intertidal aquaculture (NPWS, 2014a). The two activities that were recorded most frequently causing disturbance was walking (including with dogs) and aquaculture activities (both machinery and workers walking in the intertidal area).

7.3 Other recreational and leisure disturbance activities including horse riding were mainly concentrated on the back strand area. Water sports such as wind surfing or sailing rarely caused disturbance (NPWS, 2014a).

7.4 Disturbance events were most frequently recorded in subsite 0A442 (north central) associated with aquaculture activities, both machinery and workers walking on the intertidal zone and in subsite 0A443 (back strand) and were mainly associated with recreation activities such as walkers along the shoreline and dogs.

7.5 Recorded disturbance events that had an impact on light bellied Brent Geese included humans walking along the shoreline (specifically with dogs), bait diggers, and another disturbance due to a vehicle (unclassified). Events recorded to cause disturbance to Barnacle Geese were the presence of the counters vehicle and a flock of sheep entering a field in which the geese were present.

7.6 Additional disturbance events were noted during the site usage surveys. These included the use of 2 bangers west of Glassagh Point during counts on 08/02/2006. A further disturbance event was recorded on the same date south of Magheranaul on the east side of Doagh Isle. The nature of this disturbance event was not recorded. On a count made in 29/11/2008, a disturbance event was recorded northwest of Glassagh Point. Again the nature of the disturbance was not recorded.

Table 7.1 – Disturbance activities recorded during the NPWS baseline waterbirds surveys in 2009/2010.

	Disturbance Activity								
Subsite	Human walking (Shoreline)	Dogs	Aquaculture Machinery	Bait Digging	Humans working on aquaculture	Winkle pickers	Other (see description)	Description	**Total number of events**
0A443	5	5	1	-	-	-	-	-	11
0A439	-	-	4	-	-	1	-	-	5
0A438	-	-	-	-	-	-	2	# 1 vehicle of counter and # 2 sheep being left into field	2
0A440	1	-	-	-	-	-	-	-	1
0A441	-	-	1	-	-	-	1	No details	2
0A443	2	1	-	-	-	-	1	No details	4
0A442	-	-	6	1	4	1	1	No details	13
Total number of events	8	6	12	1	4	2	5	-	-

Proposed Aquaculture Sheds (Planning Ref. 14/50918)

7.7 The following description is extracted from a draft NIS prepared by Marchant (2014): -

The proposed development will involve the construction of four self-contained shellfish handling / sorting facilities on a single site, each of which will contain corrugated metal sheds and external working, parking and storage areas. The ground level of the site will be raised by 0.5m using unconsolidated material, and internal working areas will be surfaced with concrete. Tidal defences will be constructed on the southern site boundary, and a perimeter fence / hedgerow will be developed along the eastern boundary of the site to provide screening.

Oyster seed from a disease-free hatchery will be brought to the service site either in spring or late summer of each year, typically at an intake size of 6 - 10mm. These will be packed in oyster bags at a predetermined density and taken to the inter-tidal zone, where the bags will be attached to trestles for the growing process to begin. Time from intake to final harvest takes approximately 3 years on average, although some half-grown oysters may be despatched after two years. 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.

The intertidal area is typically accessed during spring tides (at low tide) using vans or tractors. Preparatory work will be conducted in the service area in the intervening periods, including grading and packing, preparation of bags and trestles and general maintenance. All grading and bagging processes are conducted manually (no machinery is used), and all work will take place within the proposed sheds. During seed intake and oyster dispatch periods a lorry will access the site, but this is a rare occurrence and is generally undertaken cooperatively by the four operators in order to reduce cost and disturbance.

Any oysters that die in the inter-tidal area typically degrade rapidly or are consumed by aquatic fauna in-situ, therefore the processing activities rarely produce any biological waste. Empty shells are retained on-site and spread on the ground; this practice is widely used at oyster farming facilities as the shells provide good surface hardening and drainage.

Some aspects of the proposed development have been developed specifically to avoid or reduce potential impacts upon the SAC and SPA. In order to assist with the impact assessment in section 5 of this report, further details of these features are described in the sub-sections below.

Perimeter Screening

A screen will be developed along the eastern and southern margins of the proposed development site, and the existing fence on the western side of the site will be retained, providing a continuous screen along the three seaward sides of the development. The primary purpose of the screen is to provide a barrier to visual, noise and lighting disturbance between the proposed development site and birds and other fauna in the bay (Drawings 1-3).

The southern boundary will be constructed of boulders or rock gabbions to a height of 2m above existing ground level, graded at 1:3 on the seaward side and with a cross-sectional basal width of 4.8m (Drawing 3). Buildings abutting this boundary will have solid walls (e.g. concrete blocks) and their openings will face to the north in order to direct any noise away from the bay.

The eastern boundary will consist of a closed-board wooden fence to a height of 2.5m above existing ground level. On the inside of the fence a raised bed will be constructed, measuring

0.5m height x 2m cross-sectional width, enclosed within railway sleepers or similar barriers. This will be filled with topsoil and planted with a native hedgerow. The exposed conditions and salt-spray on the bank will provide difficult growing conditions for most species, but hawthorn Crataegus monogyna, hazel Corylus avellana, and holly Ilex aquifolium *were observed growing nearby and may be able to survive in this location. Alder* Alnus glutinosa *and willow i sp may also be suitable. Sea-buckthorn* Hippophae rhamnoides, *cherry laurel* Prunus laurocerasus, *rhododendron* Rhododendron ponticum *or other invasive species will not be used. Trees will be planted in a staggered double-row and will be protected from the wind using stakes, plastic sheathes or woven willow/hazel wattle screens as required. Any trees that die will be replaced. Within a few years it is intended that the native hedgerow will form a dense barrier of up to 3-4m height which will provide additional screening along the boundary.*

Lighting

Grading and bagging will take place throughout the year, typically during daylight hours but with some night-work during peak periods in winter months. Night-work will require artificial lighting, which will be powered by a mobile generator. Four proposed lighting poles of maximum 3m height will be installed in external working areas (Drawing 4), and all lights will be fitted with directional hoods to focus light onto the working area and to avoid light-spill outside the boundaries of the site. All lighting will be switched off when the site is not in use, and lights will not be used for security purposes.

7.8 The NIS further considers Construction impacts both from disturbance and also the potential for indirect effects on e.g. water quality. Disturbance during construction was predicted to be short-term; it is to be largely avoided by undertaking works between May & September; outside the season when Light-bellied Brent Geese and Barnacle Geese are on site.

7.9 Strict adherence to on-site best practice as set out in the NIS should avoid any surface water impacts during construction (preparation of a Construction & Environmental Management Plan is, however, advisable).

7.10 Direct operational impacts are discounted in the NIS as it predicts that day-to-day activities are not within the boundaries of a Natura 2000 site.

7.11 It proposes that indirect operational impacts such as visual or noise disturbance to geese will be mitigated by provision of boundary screening and directional (hooded) lighting which should minimise disturbance and prevent light overspill from the site. With respect to water quality the NIS states that no fuels / chemicals are to be stored on site and that no vehicle fuelling is to take place on site. It states that good site practices should reduce the risk of deterioration in water quality arising from biological waste during the operational phase will also be implemented. Disposal of wastewater from any processing activities may need a discharge licence if they pose a risk to the environment (e.g. elevated BOD etc.); consideration must also be given to the Regulations dealing with animal waste etc. Development of a Waste Management Plan to more clearly identify waste streams and how they will be dealt with; including emergency response proposals for dealing with large volumes of biological waste during a mass die-off would be helpful.

7.12 Marchant (2014) concluded that the proposed development will not cause any significant negative impacts upon Natura 2000 sites. Licencing of this development above the foreshore is a matter for the planning authority of Donegal County Council; as is consideration of the need for waste licencing / permitting and /or a discharge licence to address day-to-day washing etc. That said, assuming strict adherence to environmental best practice and legislative requirements should prevent negative impacts on Chough, Light-bellied Brent Geese and Barnacle Geese.

7.13 This application was withdrawn on 21st September 2015, and will we understand be resubmitted.

Seaweed Harvesting

7.14 A commercial company, Oileán Glas Teo, have applied to the Department of the Environment, Community and Local Government for a Foreshore Licence for the hand-harvesting of the seaweed *Ascophyllum nodosum* from the intertidal shoreline in Trawbreaga Bay, County Donegal. Proposed harvesting areas are illustrated in Figure 7.1 (from Figure 3.1 of the NIS; Aquafact, 2013). The associated foreshore licence application, however, applies for use of extensive areas of foreshore which overlap with both current and new aquaculture licence applications[7].

7.15 In 2013, Aquafact International Services Ltd. generated a Natura Impact Statement (NIS) to assess the potential impacts the proposed seaweed harvesting industry would have on the conservation objectives of the qualifying interests and species of conservation importance for the Natura 2000 sites within and adjacent to Trawbreaga Bay. Oileán Glas Teo plan to harvest up to 4,000 tonne wet weight of *Ascophyllum nodosum* per annum for processing in a factory in Kilcar, Co. Donegal which produces fertilisers and feeds for animals. The proposed method of harvesting the seaweed is by hand with the Aquafact NIS stating that one or two people would cut the seaweed at low tide and a boat would be used at high tide to tow the bundles of cut seaweed which float to a suitable pier for onward haulage. The harvesting process leaves approximately 15 to 20 cm attached to the substrate to ensure re-growth of the plant, with reharvesting possible within 3 to 6 years (Guiry, 1997; in Aquafact, 2013).

7.16 The NIS does not quantify either the time spent on the foreshore or the number of days spent harvesting; nor is detailed information on phasing and location of works at any given time around the estuary presented. It is therefore not possible to quantify the level of associated disturbance to shorebirds on the foreshore and the potential for cumulative impacts with proposed oyster cultivation.

7.17 BioAtlantis (2014) in their licence application for hand-harvesting of *Ascophullum nodosum* in Clew Bay SAC indicate that harvesting would occur throughout the year (working on average 230 days/year); a team of 16 full time (or 32 part-time) staff will harvest on average 3.5 tonnes / day / person (to meet an annual need of 12,900 tonnes). The average working day is 6-8 hrs / day, with a worker covering an area of ca. 4 acres /day. In comparison, Oileán Glas Teo plan to harvest up to 4,000 tonne per annum wet weight[8]; of *Ascophyllum nodosum*.

7.18 Figure 7.1 presents the proposed access points for the proposed seaweed harvesting points and the areas of shoreline that have been identified as being suitable for seaweed harvesting. One of the proposed access points in the south is shared with an access point for aquaculture activities.

7.19 It is notable that the proposed harvesting areas pass close to and through areas that have been identified as important foraging areas for Barnacle Geese such as the improved grassland and saltmarsh west of Malin and improved grassland west of Glassagh Point and access locations.

7.20 In the conclusion of their NIS, Aquafact International Services Ltd. state that "*none of the qualifying interests, habitat functioning or conservation objectives of the North Inishowen Coast cSAC (IE002012) or of Trawbreaga Bay SPA (IE004034) within which the harvesting will occur will be significantly negatively impacted by the proposed seaweed harvesting operation in the Trawbreaga Bay*". This included an assessment of the potential impacts to species of conservation interest for Trawbreaga Bay SPA, namely Barnacle geese, Light-bellied Brent geese and Chough. Chough was screened out as they are terrestrial species.

[7] See - http://www.environ.ie/en/Foreshore/ApplicationsandDeterminations/OileanGlasTeoranta/

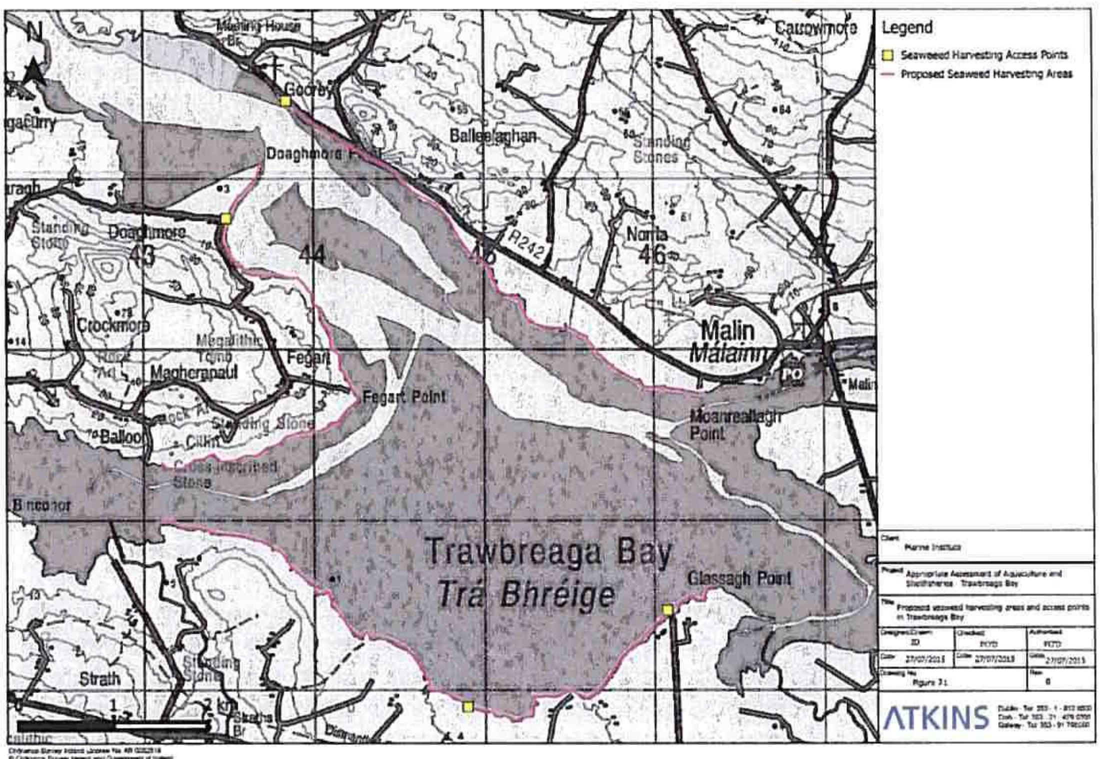
[8] BioAtlantis (2014) does not explicitly state that its weight measurements are also wet weight; but this is assumed to be the case.

7.21 Aquafact International Services Ltd. state "*the Barnacle geese graze grass on offshore islands and they therefore will not be impacted by cutters who are working on the shore line. Light-bellied Brent geese feed mostly on eel-grass, which grows on muddy estuaries, and also on grasslands, usually when coastal supplies have been depleted at estuarine sites and thus will not be significantly impacted by the proposed harvesting*".

7.22 Aquafact International Services Ltd. suggests "*the presence of one or two individuals on the shore will have an insignificant impact on other wetland and water birds which use the intertidal area for feeding*".

7.23 In addition to feeding on *Zostera* and field feeding, Light-bellied Brent Geese do make extensive use of green algae growing along the shoreline; area of dense fucoids / *Ascophyllum* are, however, less favoured. Where suitable foraging areas do occur along the shoreline, birds may be displaced during the harvesting of *Ascophyllum*. However, cutting back of *Ascophyllum* may also encourage the growth of smaller green / purple algae while *Ascophyllum* is recovering thereby providing new foraging opportunities for Light-bellied Brent Geese. The overall impact on Light-bellied Brent Geese will therefore be a balance of localised disturbance / displacement versus potential new foraging opportunities arising from phased management of *Ascophyllum* around the estuary.

7.24 If seaweed harvesting is to be licenced we would recommend the development of a working Code of Practice (see e.g. BioAtlantis, 2014); including clear guidance on access, minimising disturbance; avoiding critical areas of the harbour (e.g. areas adjoining key Barnacle geese feeding fields when these are present) etc. We would also recommend that a condition of licencing would be to determine how Light-bellied Brent Geese are impacted by proposed harvesting measures and that any findings feed back into the Code of Practice. Consideration should be given to an over-arching Management Plan / Code of Practice covering both seaweed harvesting and aquaculture activities within the estuary; close liaison with NPWS regarding patterns of use of Trawbreaga by both Light-bellied Brent Geese and Barnacle Gees would be a key part of this process.


Legend
Seaweed Harvesting Access Points
Proposed Seaweed Harvesting Areas
Trawbreaga Bay
Trá Bhréige
Malin
Málainn
Glassagh Point
Fegart Point
Moanreallagh Point
Doaghmore
Crockmore
Magheranaul
Balleelaghan
Norrira
Strath
R242
Client Marine Institute
Project Appropriate Assessment of Aquaculture and Shellfisheries Trawbreaga Bay
Title Proposed seaweed harvesting areas and access points in Trawbreaga Bay
Designed/Drawn JD
Checked FOTD
Authorised FOTD
Date 27/07/2015
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Residential / Recreational Developments

7.25 A search of the Donegal County Council online planning permission application system showed that two additional developments had applied for planning permission in the environs of Trawbreaga Bay in recent years.

7.26 In 2008, Rasheeney F.C applied for and received permission to erect 8 flood lights (15 m high) around their pitch at Ballymacmoriarty on the Isle of Doagh. In addition the lighting, the development included the erection of a shed containing a 3 phase electricity generator (Planning application number: 087/0180; Donegal County Council online Planning Enquiry System [accessed July, 2015]). No details of an ecological assessment or AA screening/NIS undertaken to support the planning application are presented in the online planning file. The property is located 187 m from the boundary of the SPA.

7.27 An additional planning application (Planning application number: 09/70378; Donegal County Council online Planning Enquiry System [accessed July, 2015]) was made for the demolition of existing cottage and garage at Glebe to be replaced by a detached dwelling house and associated works including improvement of existing septic tank and percolation area was made in 2009 and the case was granted conditional permission in 2010.

7.28 There is also an application for retention of an existing outdoor equestrian arena and construction of a number of associated equestrian facilities such as stable as well as a café, apartments etc. (07/71506). The arena is located south of the R242 Lagg Road in Balleelaghan.

Activities affecting waterbird food resources

Bait digging and shellfish collecting

7.29 None of the special conservation interests in Trawbreaga Bay SPA rely on infaunal or epifaunal shellfish in their diets. As a result bait digging and shellfish collecting will not have a direct effect on the SCI species. However, the presence of bait diggers and shellfish collectors along the shoreline and in the intertidal area may have an effect on SCI species though disturbance.

7.30 In Trawbreaga Bay, bait digging and shell fish collecting appears to be a low intensity activity only being recorded in one subsite during the NPWS BWS low tide counts. This compares to bait digger numbers of 46-544 throughout the year in the Masero *et al.* (2006) study. Therefore, at current levels it seems unlikely that bait digging is having measurable impacts in terms of physical habitat disturbance in Trawbreaga Bay compared to other SPA which are located closer to larger population densities such as Dublin Bay, Cork Harbour or Dungarvan Bay.

Water Quality

7.31 The coastal water quality in Trawbreaga Bay has been classified as unpolluted (EPA web mapping, 2015).

7.32 A number of rivers flow into Trawbreaga Bay including the Staid River (Good status – Q4), the Donagh River (Moderate status – Q3-4), the Glennagannon River (Good status – Q4), an unnamed stream entering the bay at Malin (Poor status – Q2-3, Q3) and Ballyboe River (Poor Status – Q2-3, Q3) (EPA web mapping, 2015). A number of additional streams enter the bay but the water quality of these waterways are not currently being monitored. NPWS (2014A) report the status of the Ballyboe River as 'good;' the Glennagannon River as 'moderate' and the Donagh River 'good-poor'.

7.33 The quality of water entering the bay downstream of Carndonagh remains below the Water Framework Directive requirements of good or better standards despite improvements following the

commissioning of a new wastewater treatment plant in 2005 (NPWS, 2014a). In addition the Ballyboe River and unnamed river entering the bay at Malin are also failing to meet Water Framework Directive requirements. Nutrient input to the estuary is most likely contributing to the growth of green algae within the estuary that is fed on by Light-bellied Brent Geese; it is, however, a requirement under the Water Framework Directive that water quality entering and within the bay be improved.

8. Concluding Statement

8.1 As noted above it is not anticipated that Chough would be impacted by the proposed aquaculture activities. The main disturbance threat to Chough comes from recreational pressures in the dune systems used by Chough and agricultural change affecting favoured feeding habitat.

8.2 There is a risk that presence of additional people on the shore either harvesting seaweed or bait digging etc. could increase the level of disturbance on Light-bellied Brent Geese above that arising from aquaculture activities. However, there is insufficient information in the NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with seaweed harvesting. The Light-bellied Brent Geese population is, however, currently in favourable conservation status and as noted management of *Ascophyllum* may in fact provide feeding opportunities for Light-bellied Brent Geese by encouraging the growth of smaller green / purple algae in short-term cycles before *Ascophyllum* regrows and out-competes them (see comments on proposed Code of Practice / monitoring recommendations).

8.3 Like Light-bellied Brent Geese, Barnacle Geese are also in favourable conservation status with a growing population in Trawbreaga / Malin. They are most at risk from disturbance / displacement preventing them from using key foraging sites and to a lesser extent intertidal day-time roost sites. Use of access points and shore based activities must be done in a such a way as not to disturb geese; for example the aquaculture sheds proposed for Balleelaghan (Lagg Road) must be adequately screened to prevent displacement of Barnacle Geese feeding in fields to the west of Malin (south of Lagg Road). Given the distance to preferred fields geese are likely to habituate to routine patterns of noise; as they have to day-to-day patterns of road traffic, farmyard and residential noise sources close to preferred fields. That said workers on the shoreline immediately adjoining preferred fields could result in localised displacement in addition to that arising from aquaculture activities. Of most concern would be an increase in onshore activities close to favoured areas at Magheranaul / Strath; near Malin and along the approaches to the access point at Glassagh Point. It is unclear how Barnacle Geese using this area in particular would respond.

8.4 As noted, there is insufficient information in the Seaweed NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with seaweed harvesting; the BioAtlantis (2014) NIS for 2014 does, however, speak about seasonal restrictions in ecologically sensitive areas which were agreed with NPWS. Given that hand-harvesting would appear to be year round it is recommended that such restrictions be incorporated into a proposed Code of Practice discussed above in order to avoid impacting key Barnacle Geese sites.

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Appendix A

Scientific names of species mentioned in the text

Common name	Scientific names	BTO code
Bewick's Swan	*Cygnus columbianus bewickii*	BS
Chough	*Pyrrhocorax pyrrhcorax*	CF
Common Gull	*Larus canus*	CM
Common Tern	*Sterna hirundo*	CN
Coot	*Fulica atra*	CO
Cormorant	*Phalacrocorax carbo*	CA
Corncrake	*Crex crex*	CE
Curlew	*Numenius arquata*	CU
Greenland White-fronted Goose	*Anser albifrons flavirostris*	NW
Barnacle Goose	*Branta leucopsis*	BY
Bar-tailed Godwit	*Limosa lapponica*	BA
Black-headed Gull	*Chroicocephalus ridibundus*	BH
Cormorant	*Phalacrocorax carbo*	CA
Curlew	*Numenius arquata*	CU
Dunlin	*Calidris alpina*	DN
Eider	*Somateria mollissima*	E.
Fulmar	*Fulmarus glacialis*	F.
Gadwall	*Anas strepera*	GA
Goldeneye	*Bucephala clangula*	GN
Golden Plover	*Pluvialis apricaria*	GP
Great Crested Grebe	*Podiceps cristatus*	GG
Greenshank	*Tringa nebularia*	GK
Grey Heron	*Ardea cinerea*	H.
Grey Plover	*Pluvialis squatarola*	GV
Greylag Goose	*Anser anser*	GJ
Guillemot	*Uria aalge*	GU
Herring Gull	*Larus argentatus*	HG
Kittiwake	*Rissa tridactyla*	KI
Knot	*Calidris canutus*	KN
Lapwing	*Vanellus vanellus*	L.
Light-bellied Brent Goose	*Branta bernicla hrota*	PB
Mallard	*Anas platyrhynchos*	MA
Merlin	*Falco columbarius*	ME
Mute Swan	*Cygnus olor*	MS
Oystercatcher	*Haematopus ostralegus*	OC
Peregrine Falcon	*Falco peregrinus*	PE
Pochard	*Aythya ferina*	PO
Razorbill	*Alca torda*	RA
Red-breasted Merganser	*Mergus serrator*	RM
Red-throated Diver	*Gavia stellate*	RH
Redshank	*Tringa totanus*	RK
Ringed Plover	*Charadrius hiaticula*	RP
Sandwich Tern	*Thalasseus sandvicensis*	TE
Scaup	*Aythya marila*	SP
Shag	*Phalacrocorax aristotelis*	SA

Shelduck	*Tadorna tadorna*	SU
Shoveler	*Anas clypeata*	SV
Slavonian Grebe	*Podiceps auritus*	SZ
Teal	*Anas crecca*	T.
Tufted Duck	*Aythya fuligula*	TD
Whooper Swan	*Cygnus cygnus*	WS
Wigeon	*Tadorna tadorna*	WN