

Appropriate Assessment of Aquaculture

Trawbreaga Bay SPA

Marine Institute

06/08/2021



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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 Qualifying Interest (QI) 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 waterbirds 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). 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 sites use by geese (Emmett Johnston, Local Conservation Ranger, NPWS). These were supplemented by recent goose counts from 2020 and 2021 (Source: NPWS & collected as part of this study).

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 QI 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 Qualifying Interests 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. The wetland habitats within Trawbreaga Bay SPA and the waterbirds that utilise this resource are an additional QI (the wetlands and water bird QIs). The conservation objective for this QI 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 Qualifying Interests of the Inishtrahull SPA are non-breeding populations of Barnacle Goose and breeding populations of Shag and Common Gull, while the Qualifying Interests 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 Qualifying Interest 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 Inishtrahull, 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 Qualifying Interests, 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). The current assessment covers 14 no. new applications covering an area of 10.13ha, as illustrated in Figure 6.1. It was assumed that all existing licences and licences under appeal are operational and form part of the existing activities in the SPA at the time this report was drafted. By assuming existing licences and licences under appeal are all operational enables this assessment of the impacts of the aquaculture activities proposed in the new licence applications to be based on worst-case principles (refer to consideration of In-Combination Impacts in Chapter 7.0).

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. 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.

Farms on the intertidal area are typically accessed during 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, producers observe one access route from the shore to their farm area. In the south of the Bay producers access growing areas using one dedicated access route from the shore at Glassagh Point. There are four further access points to local areas of trestles along the shore of Doagh Island (see Figure 6.1). Detailed information as to the number of tractors / operators on site at any given time and the number of days per month when there will be activity onshore were not available at the time of writing.

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. Atkins recorded a peak of 2,479 at Ballyliffin in February 2021. The site conservation condition for Barnacle Goose at Trawbreaga Bay SPA has 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 small scale 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. While the risk of negative impacts cannot be entirely discounted, geese are likely to habituate to repeated patterns of work at trestles on the intertidal close to foraging fields. That said, development of a clear Code of Practice is strongly recommended; as is close consultation with NPWS. Continuation of annual monitoring of Barnacle Geese is also recommended to identify and address any disturbance issues that might arise, with particular emphasis on areas around Magheranaul / Strath; Malin and Glassagh Point.

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 was calculated using IWeBS data and was based on the change between the baseline period (mean 1995/96 to 1999/00) and more 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). As a result, the site conservation condition for Light-bellied Brent Goose at Trawbreaga Bay SPA was assessed as favourable based on the increasing population. However, recent counts are significantly lower (e.g. 151 on 10th February 2021) and suggest that numbers have declined significantly at Trawbreaga Bay.

Light-bellied Brent Geese were recorded in all but one subsite (0A441 – Malin) during the NPWS baseline waterbird surveys. Intertidal foraging had recorded them within five subsites overall: 0A438, 0A439, 0A440, 0A442 and 0A443 (NPWS, 2014c). 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. It is within these sites that new Applications are located. These two subsites also held high peak and mean numbers of Brent Geese. In 2021 birds were recorded from 0A442 and 0A443, with small numbers in 0A439 (i.e. near Doagh Island and Glassagh).

Based upon the NPWS low tide surveys (2009/10), the proposed applications would result in displacement of up to 5.36% of the geese using Trawbreaga Bay SPA and represents a significant negative impact on the conservation status of Light-bellied brent geese using Trawbreaga Bay SPA. In-combination impacts with existing trestles would result in displacement of up to 13.78% of the geese using Trawbreaga Bay SPA. As shown on Figure 6.5 the 2 counts undertaken in 2021 suggest that the number of areas within the bay being used by geese has declined, with smaller numbers of geese being located within a more confined area from Fegart Point to Lagg Beach.

Concluding Statement

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. As noted, a National Survey of Chough is proposed for 2021.

Barnacle Geese

The site conservation condition of Barnacle Goose at Trawbreaga Bay SPA has 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 small scale 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. While the risk of negative impacts cannot be entirely discounted, geese are likely to habituate to repeated patterns of work at trestles on the intertidal close to foraging fields. 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 may arise in the future. Furthermore, it is our understanding that NPWS intend to use data from an ongoing programme of darvic colour ringing to examine local site use and movements. Once available this should also be reviewed against ongoing patterns of aquaculture activity.

It should also be a condition of planning that no dogs are allowed when accessing the foreshore to avoid disturbing geese; 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; and that unused equipment (e.g. trestles; bags etc.) are removed from the foreshore.

Light-bellied brent geese

When compared to historic site counts, recent counts undertaken in 2019 and 2021 suggests a large recent decline in numbers of Light-bellied brent goose at Trawbreaga. Thus, the conservation condition of Light-bellied brent geese has been assessed as Unfavourable In Trawbreaga Bay SPA. The decline in Trawbreaga would appear to be higher than the current national trend which is a -15.5% (5 year; 2012 census); -10.2% (10 year; 2007 census) and +96 % (20 year; 1997 census). Unlike Barnacle geese, Light-bellied brent goose feed both on the foreshore and in areas of improved grassland. It is not clear whether birds i) preferentially moved to feed on grassland; ii) being displaced from the foreshore and forced to feed on grassland or iii) being displaced entirely from Trawbreaga Bay SPA to another site, such as Lough Swilly. While there is evidence of field feeding numbers involved is unknown. There is anecdotal evidence that numbers of Light-bellied brent geese at Lough Swilly have increased.

As noted, 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. No decision has as yet been made on this application. In a similar application in Clew Bay (Ecofact, 2014) restrictions on timing of works in ecologically sensitive areas which were included in a Code of Practice. With respect to in-combination impacts, the 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 Seaweed Harvesting NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with proposed seaweed harvesting. While the potential for management of *Ascophyllum* to 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 cannot be discounted, the risk of increased patterns of disturbance could result in significant negative impacts (see comments on proposed Code of Practice / monitoring recommendations).

It is, however, noted that Light-bellied Brent Goose do feed on terrestrial grassland, though the degree to which this is undertaken at Trawbreaga has not been established. Without a clear understanding of the spatial distribution of Light-bellied brent geese and the use of terrestrial foraging grounds within the bay and environs, it cannot be stated whether the reduced number of observed birds can be explained by birds moving to feed terrestrially or whether birds have vacated the site. It therefore cannot be stated with confidence that displaced geese can be accommodated on grassland within Trawbreaga Bay and environs.

With respect to mitigation measures, an option to be considered would be the management of areas of grassland specifically for Light-bellied brent geese. This has recently been done in Baldoyle Bay, Dublin by Fingal County Council and should be explored further with National Parks and Wildlife Service. As noted, NPWS have recently entered in a number of farm plans with local landowners. Consideration should be given to development of a Code of Practice covering aquaculture activities within the estuary; close liaison with NPWS regarding patterns of use of Trawbreaga by both Light-bellied Brent Geese and Barnacle Geese would be a key part of this process. For example, it should be a condition of planning that no dogs are allowed when accessing the foreshore to avoid disturbing geese; 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.

1. 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 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).

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 SPA (site code 004146) and Greers Isle SPA (site code 004146).

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

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.

For the Appropriate Assessment of aquaculture, the data analysis and report writing was done by Paul O'Donoghue. An assessment of Aquaculture in Trawbreaga Bay SPA was originally undertaken in 2015 (Atkins, Sept. 2015); additional applications were subsequently assessed in May 2016, December 2017, July 2018 and July 2019).

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

1.1. Scope of the Assessment

1.1.1. Aquaculture

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.

1.1.2. Structure of this report

The structure of the report is as follows: -

- Section 2 describes the methodology used for the assessment;
- Section 3 lists the Special Conservation Interests (QIs) of the SPAs included in this assessment, and describes the Conservation Objectives, and their attributes and targets, that have been defined for these QIs;
- Section 4 contains a preliminary screening assessment that screens out QIs 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 QIs 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 QIs of the Trawbreaga Bay SPA and other nearby SPAs;
- Sections 6.1 presents a detailed assessment of the likely impact of intertidal oyster cultivation on the QIs 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 6.2 contains an assessment of cumulative impacts from the in-combination effects of aquaculture with other relevant activities;
- Section 7.0 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 QIs of the Trawbreaga Bay SPA and other nearby SPAs;
- Section 8.0 presents Conclusions & Recommendations;
- Section 9 – References.

1.1.3. Constraints to this assessment

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 in the count subsites and the areas outside the count subsites but inside the SPA are unlikely to be used by geese.

There is relatively good information available on the low tide distribution of waterbirds in Trawbreaga Bay in winter through the NPWS Waterbird Survey Programme (WSP) counts; this data is, however, from the winter of 2009/2010. Irish Wetland Bird Survey (IWEBS) counts, however, are more limited, with very limited recent IWEBS counts.

However, these data were complemented by a number of sources of data provided by NPWS. The data provided by NPWS summarised the findings of a study of site usage undertaken in the winter of 2007/2008 as well as discussion of which areas are generally favoured by geese in Trawbreaga (Emmett Johnston, NPWS, *pers comm*). Light-bellied Brent Geese are known to feed in estuarine habitats. In contrast Barnacle Geese favour improved agricultural grassland, though preferred sites are often located close to Irish estuaries; despite this there appears to be no published information of the occurrence of Barnacle Geese within estuarine habitats. While the age of these data should, however, be noted, further data from 2021 was also provided by NPWS (Lee McDaid, NPWS, *pers comm*). To further enhance the data available and our understanding of the site was also visited in February 2021; details of which are provided below.

There is a strong base for the assessment of displacement impacts for some of the aquaculture activities, particularly intertidal oyster cultivation (i.e. the cultivation of oysters in bags on oyster trestles as well the use of well as the use of access tracks and / or shore based facilities)

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. Methods

2.1. General

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 (O'Donoghue, 2018). As noted, the site was also visited in February 2021.

2.2. Data sources

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 based upon site lists supplied to the Marine Institute by the Department of Agriculture, Food and the Marine. An Aquaculture Profile was provided by Bord Iascaigh Mhara (BIM, 2014, 2019, 2021). Spatial mapping of existing aquaculture structures on site was provided by the Engineering section of Department of Agriculture, Food and the Marine (DAFM).

Subsite count boundaries were provided by Dr. Lesley Lewis (NPWS waterbird survey programme) and Olivia Crowe, formerly of BirdWatch Ireland (IWEBS).

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

- Irish Wetland Bird Survey (IWEBS) counts 1994/95-2013/14¹;
- NPWS waterbird survey programme (NPWS WSP) 2009/10 counts;
- NPWS Non-estuarine Waterbird Survey (NPWS NEWS) 2015/16 counts;
- Additional count / spatial data provided by NPWS - 2007/2008 (Emmett Johnston, NPWS *pers comm*) and 2021 (Lee McDaid, NPWS, *pers comm*);
- Data from a site visit in February 2021; and
- Additional sources of published bird data.

We understand that further counts may have been undertaken in recent years in Trawbreaga Bay but were unable to resolve when or by whom these may have been undertaken.

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.²

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 WSP counts (Cummins and Crowe, 2010) and field observations from Emmett Johnston (NPWS Conservation Ranger for Inishowen) (O'Donoghue., 2018).

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).

¹ There are no IWEBS counts available for after 2013 / 2014.

² <https://www.npws.ie/maps-and-data/habitat-and-species-data> (downloaded 11/05/2015; last updated by NPWS 15/01/2015)

The site was revisited in February 2021. Due to Covid-19 restrictions this survey work was done by an ecologist living closer to the site (i.e. Robert Vaughan, Woodrow Environmental Consultants on behalf of Atkins). The main focus was to visit proposed shore access points; as well as counting any Light-bellied Brent Geese and Barnacle geese encountered during the study.

In a number of cases Light-bellied Brent Geese and Barnacle geese were found to be carrying plastic darvic³ rings. Where these could be read in the field records have been forwarded to the project co-ordinator (Dr. Kendrew Colhoun).

2.3. Trawbreaga Bay SPA

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.

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, 2014b).

2.4. Shellfish Waters

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 number of clams and mussels. The designated shellfish area in Trawbreaga Bay is 4.3 km² and stretches from Moanrealtagh Point to Doaghmore Point and around Fegart Point. The contributing catchment of the shellfish area is 144.4 km² in area and includes a number of small rivers and streams, chiefly the Ballyboe, Donagh and Glennagannon Rivers (RPS, 2013).

2.5. Other Designations

Trawbreaga Bay is also part of the North Inishowen Coast proposed Natural Heritage Area / Special Area of Conservation (site code 002012; NPWS, 2014i).

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.

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

³ Darvics are numbered plastic rings placed in birds which can be read in the field.



Trawbreaga Bay SPA

Glashedy Island
 Oileán na Dumhcha

Client:	Marine Institute		
Project:	Trawbreaga Bay SPA - AA		
Title:	Trawbreaga Bay SPA		
Designed/Drawn:	Checked:	Authorised:	
POD	POD	POD	
Date: 18-03-21	Date: 18-03-21	Date: 18-03-21	
Drawing No: 2.1		Rev: 1.0	

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2.6. Bird Count Subsites

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.

2.6.1. BirdWatch Ireland IWEBS Subsites

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. There are no IWEBS counts for Trawbreaga Bay for the period after the winter of 2012/2013.

2.6.2. NPWS Waterbird Survey Programme

Trawbreaga Bay was also divided into 6 subsites for the NPWS Waterbird Survey Programme (WSP, 2009 / 10) (Figure 2.3) (Cummins and Crowe, 2010). The boundaries of the WSP subsites broadly follow those of the IWEBS. However, there are slight differences outlined below.

2.6.2.1. Subsite area variations

The boundaries of IWEBS and WSP 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.

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 2.2 summarises the variation between IWEBS and WSP site boundaries.

Table 2.1 Variation in subsite areas from IWEBS and WSP subsites in Trawbreaga Bay.

Subsite Code	IWEBS area (ha)	WSP 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)	1,194.63	1,236.79

Table 2.2 Variation in subsite areas from IWEBS and WSP subsites in Trawbreaga Bay.

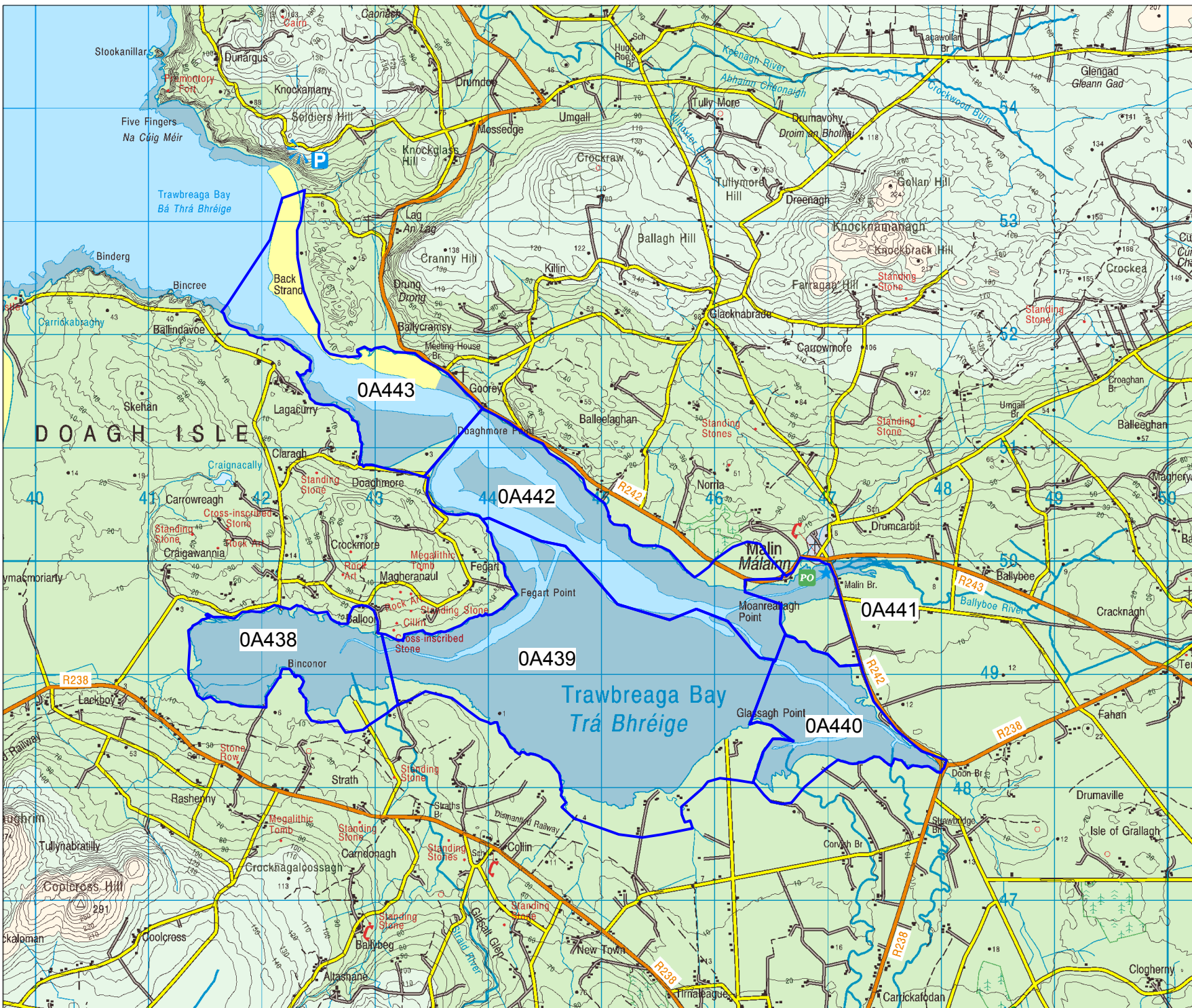
Date	Species	Number
19 th January 2016	Peregrine	1
	Eider	7
	Common Gull	3
	Great Northern Diver	1
	Herring Gull	7
	Oystercatcher	9

Date	Species	Number
	Grey Heron	1
	Chough	2
	Raven	1
	Rock Pipit	5
	Rock Pipit	2
8 th February 2016	Lesser Black-backed Gull	1
	Herring Gull	1
	Cormorant	1
	Pied Wagtail (<i>yarrellii</i>)	1
	Long-tailed Duck	3
	Oystercatcher	1
	Ringed Plover	6
	Redshank	1
	Shelduck	1
	Hooded Crow	2

2.6.2.2. BWI NEWS Transects

The BWI non-estuarine waterbirds survey (NEWS) transects located at Trawbreaga Bay are divided into three sections on the north and south Coasts at the mouth of the bay (count sectors A019, A020 & A021). 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.

In the 3rd Non-Estuarine Coastal Waterbird Survey which ran over the winter of 2015 / 16 only sector A019 was counted (Figure 2.4) on the 19th January 2016 and 8th February 2016.



 IWEBS Subsite Boundaries

Client:	Marine Institute		
Project:	Trawbreaga Bay SPA - AA		
Title:	IWEBS Subsite Boundaries		
Designed/Drawn:	POD	Checked:	POD
Date:	18-03-21	Date:	18-03-2021
Drawing No:	2.2	Authorised:	POD
		Date:	18-03-2021
		Rev:	1.0

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WSP Subsite Boundaries

Client:	Marine Institute		
Project:	Trawbreaga Bay SPA - AA		
Title:	WSP Subsite Boundaries		
Designed/Drawn:	POD	Checked:	POD
Date:	18-03-2021	Date:	18-03-2021
Drawing No:	2.3	Authorised:	POD
		Date:	18-03-2021
		Rev:	1.0

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IWEBS Subsite Boundaries

Trawbrega - NEWS III

- A021
- A020
- A019

Client:	Marine Institute		
Project:	Trawbrega Bay SPA - AA		
Title:	NEWS III Count sectors		
Designed/Drawn:	Checked:	Authorised:	
POD	POD	POD	
Date: 18-03-2021	Date: 18-03-2021	Date: 18-03-2021	
Drawing No:	Rev:		
2.4	1.0		

ATKINS Dublin - Tel: 353 - 1 - 890 9000
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 Galway - Tel: 353 - 91 786050

2.6.2.3. Biotopes

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).

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.

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).

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

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).

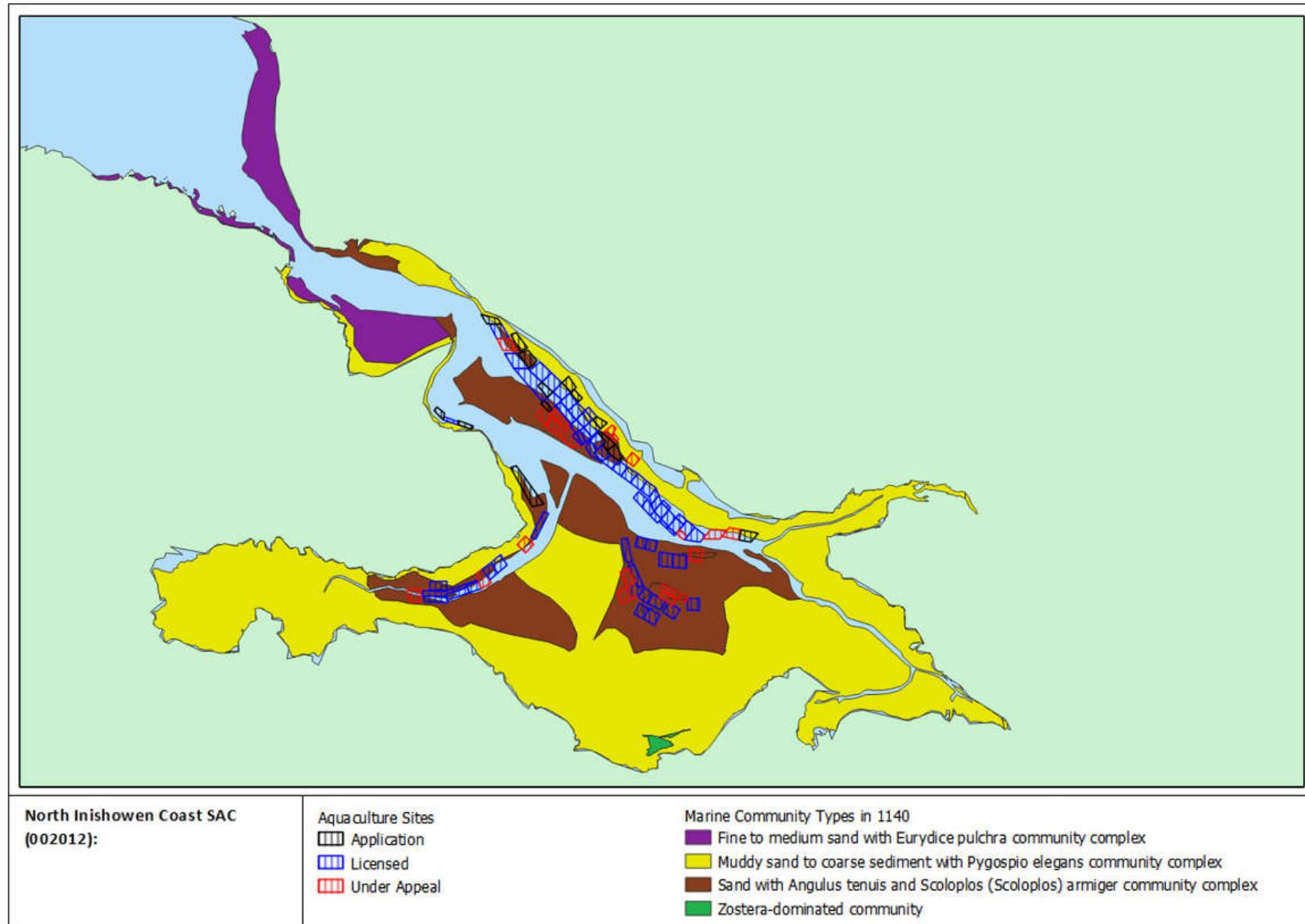


Figure 2.5 – Aquaculture sites (licenced and applications) at Trawbreaga Bay relative to principal benthic communities (Source: from SAC Assessment).

2.7. Analyses of waterbird distribution

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.

Waterbird distribution has been mainly analysed by reviewing count data across subsites from the NPWS WSP and/or IWEBS 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 WSP flock map data has also been used as well as additional survey and spatial data from Emmett Johnston, NPWS.

2.7.1. Use of data sources

2.7.1.1. Irish Wetland Bird Survey (IWEBS)

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 2.3 below.

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

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 waterbird survey programme. 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.

Table 2.3 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	2006/07	No Data	0
1995/96	S, O [^] , J, F [*]	57	2007/08	D, F [^]	29
1996/97	S [^] , O, N, D [^] , J [*] , F	86	2008/09	S [^] , N, J	43
1997/98	O [^] , N, D, J, F, M	86	2009/10	O [^] , N [^] , J [*] , F, M	71
1998/99	N, D, J, M	57	2010/11	N	14
1999/00	N, D [^]	29	2011/12	F, M	29
2000/01	No Data	0	2012/13	N	14
2001/02	F	14	2013/14	No Data	0
2002/03	J [^] , F, M	43	2014/15	No Data	0
2003/04	No Data	0	2015/16	No Data	0
2004/05	No Data		2016/17	No Data	0
2005/06	No Data	0	Not used		

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).

2.7.1.2. NPWS waterbird survey programme

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 waterbird survey programme 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.

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).

The NPWS WSP 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.

As part of the NPWS waterbird survey programme, 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.

2.7.1.3. Goose Counts

NPWS kindly provided additional data on both Barnacle Goose and Light-bellied Brent Goose from 2007/2008. 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. This was based on site usage studies undertaken by NPWS in the winter of 2007/2008 as well as discussion of which areas are generally favoured by Barnacle geese in Trawbreaga when they are recorded within the estuary. The age of this data is however, noted. [Source: Emmett Johnston, Conservation Ranger (CR), Inishowen].

Further data were also provided by NPWS from 2021 [Lee McDaid, current Conservation Ranger (CR), Inishowen].

As noted, to further enhance the data available and our understanding of the site was also visited in February 2021. The site was revisited in February 2021. Due to Covid-19 restrictions this survey work was done by an ecologist living closer to the site (i.e. Robert Vaughan, Woodrow Environmental Consultants on behalf of Atkins). The main focus was to visit proposed shore access points; as well as counting any Light-bellied Brent Geese and Barnacle geese encountered during the study.

2.8. Appropriate Assessment Process

2.8.1. Legislative Context

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora, known as the 'Habitats Directive' provides legal protection for habitats and species of European importance. Article 2 of the Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 – 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservations of an EU-wide network of sites known as European sites. European sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC).

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans or projects that could potentially affect European sites. Article 6(3) establishes the requirement for Appropriate Assessment: -

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.”

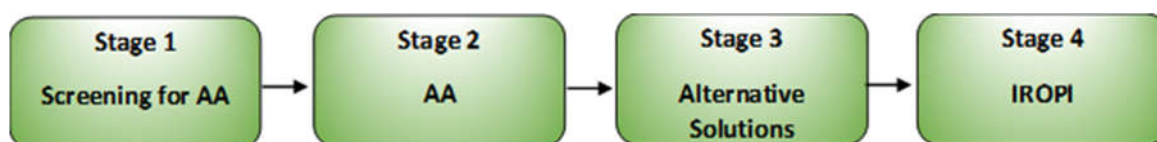
Article 6 (4) deals with the steps that should be taken when it is determined, as a result of Appropriate Assessment, that a plan or project will adversely affect a European site. Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures need to be addressed in this case. Article 6(4) states: -

“If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.”

2.8.2. Appropriate Assessment Steps

Guidance on the AA process was produced by the European Commission (EC, 2001; 2018), which was subsequently used to develop guidance for Ireland by the Department of Environment, Heritage and Local Government in 2009 (DEHLG, 2009) and also by the National Parks and Wildlife Service in 2018⁴ (NPWS 2018). These guidance documents set out a staged approach to complete the AA process and outlines the issues and tests at each stage. The stages outlined below are taken from the guidance document *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2009).



Text Figure 2.1 Appropriate Assessment Process (Source: DEHLG, 2009).

2.8.2.1. Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3): -

- i. Whether a plan or project is directly connected to or necessary for the management of the site, and
- ii. Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, then the process must proceed to Appropriate Assessment.

2.8.2.2. Appropriate Assessment

Appropriate Assessment considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any necessary mitigation measures.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where sufficient mitigation cannot be achieved, the alternative solutions need to be considered and the process proceeds to the consideration of alternative solutions.

2.8.2.3. Alternative Solutions

This examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a European site. The process must return to AA as alternatives will require assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, it is necessary to examine whether there are imperative reasons of overriding interest (IROPI).

2.8.2.4. IROPI

This examines whether there are imperative reasons of overriding public interest for allowing a plan or project that will have adverse effects on the integrity of a European site to proceed in cases where it has been established that no less damaging alternative solution exists. Compensatory measures must be proposed and assessed, of which the Commission must be informed.

The AA process only progresses through the full process for certain plans and projects. For example, for a project not connected with the management of a European site and where no likely significant effects on a

⁴ <https://www.npws.ie/development-consultations>

European site in view of its conservation objectives are identified, the process stops at Screening for AA. Throughout the process the precautionary principle must be applied, which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty (EC, 2001; 2018).

2.8.3. Legislation & Guidance Documents

This report was prepared with reference and due consideration to the following documents and due regard for relevant case law, including but not limited to: -

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna (Habitats Directive);
- Statutory Instrument No. 477/2011 — European Communities (Birds and Natural Habitats) Regulations 2011;
- European Commission (2020). Managing Natura 2000 sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2006). Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2002). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.
- Department of the Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities; and,
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01; and,
- Case C-323/17 People Over Wind & anor. V. Coillte and other relevant court rulings and case law.

2.8.4. General approach

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 (QI) species of the Trawbreaga Bay SPA (NPWS, 2014b).

The conservation objectives for QI 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.

This assessment focuses on assessing potential impacts on the spatial distribution of the QI 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 in a Natura Impact Statement (Section 6).

The basis for the assessments are datasets that indicate the distribution of waterbird species between different broad sectors of Trawbreaga Bay (the IWEBS and NPWS WSP counts) as well as additional data informed by local knowledge and long term observations by the local NPWS conservation ranger and recent goose counts. In general, such datasets allow calculation, or qualitative assessment, of the proportion of a 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).

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.

The above assessment is particularly suited to the assessment of potential impacts on waterbirds which utilise areas of intertidal and subtidal habitat. However, in the case of Trawbreaga Bay, Barnacle geese primarily feed on supratidal habitats, mainly improved grassland, with preferred foraging areas often adjoining the estuary. Small flocks of Barnacle geese are known to roost on occasion within areas of intertidal habitat; this is often associated with access to sources of freshwater, such as small freshwater creeks entering the estuary. In contrast, Light-bellied brent geese will feed both in intertidal and shallow subtidal habitats; as well as foraging on areas of improved grassland.

2.8.4.1. Structure of the assessment

An initial screening exercise was carried out to screen out QI 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 QIs 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.

The potential impacts of the intertidal oyster cultivation on all the remaining QI species that cannot be screened out were assessed in the Natura Impact Statement (Section 6). As noted, QI species from other SPAs were included in this assessment, but the assessment was limited to the potential impact on their utilisation of Trawbreaga Bay.

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 QI species from other SPAs was limited to the potential impact on their utilisation of Trawbreaga Bay.

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

2.8.4.2. Identification of potential impacts

Potential negative impacts to QI 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.

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.

2.8.4.3. Assessment of impact magnitude

Where potential impacts from an activity on a QI 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.

2.8.4.4. Trawbreaga Bay non-breeding QI species

The normal approach adopted in the detailed assessment methodology is to quantify the potential displacement impacts for the Trawbreaga Bay non-breeding QI 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.

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.

All of the aquaculture plots are covered by the NPWS waterbird survey programme or IWEBS 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.

2.8.4.5. Additional QIs from other SPAs

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

2.8.5. Assessment of impact significance

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 QI. 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.

2.8.5.1. Trawbreaga Bay non-breeding QI species

Attribute 1 – Long term population trends

The criteria that we have used for assessing significance with reference to attribute 1 of the conservation objectives are summarised in Table 2.4 and are described below.

If the impact is predicted to cause spatial displacement of >25% of the total Trawbreaga Bay population of a QI 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.

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.

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 2.4 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

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.

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.

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

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%.

Impacts that will cause displacement of 5% or more of the total Trawbreaga Bay population of a QI 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 QIs

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

3.1. Trawbreaga Bay SPA (Site code: 004034)

3.1.1. Special Conservation Interests

The Special Conservation Interests (QIs) 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.

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

3.1.2. Conservation objectives

3.1.2.1. QI species

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, 2014b/c).

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, 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	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 (2014c) but are numbered here for convenience.

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, 2014b) 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 <i>et al.</i> (2006); Gray <i>et al.</i> (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 (2014b).

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

3.1.2.2. Wetlands

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, 2014c).

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 (2014b).

3.2. Sites within 15km of Trawbreaga Bay SPA

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; NPWS, 2020a) and Inishtrahull SPA (004100; 11.6 km northeast of Trawbreaga Bay SPA; NPWS, 2020b) (Figure 3.1).

3.2.1. Generic Conservation Objectives

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
<p>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.</p> <p>The overall conservation objective is <i>"to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA"</i> (NPWS, 2015).</p> <p>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.</p> <p>General indications that a habitat has achieved favourable conservation status presented in the conservation objective document include when: -</p> <ul style="list-style-type: none"> • 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. <p>General indications that a species has achieved favourable conservation status presented in the conservation objective document include when: -</p> <ul style="list-style-type: none"> • 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.

3.2.2. Inishtrahull SPA (Site code: 004100)

3.2.2.1. Special Conservation Interests

The Special Conservation Interests (QI) of the Inishtrahull SPA are non-breeding populations of Barnacle Goose and breeding populations of Shag and Common Gull (NPWS, 2020b).

3.2.2.2. Conservation objectives

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.

3.2.3. Malin Head SPA (Site code: 004146)

3.2.3.1. Special Conservation Interests

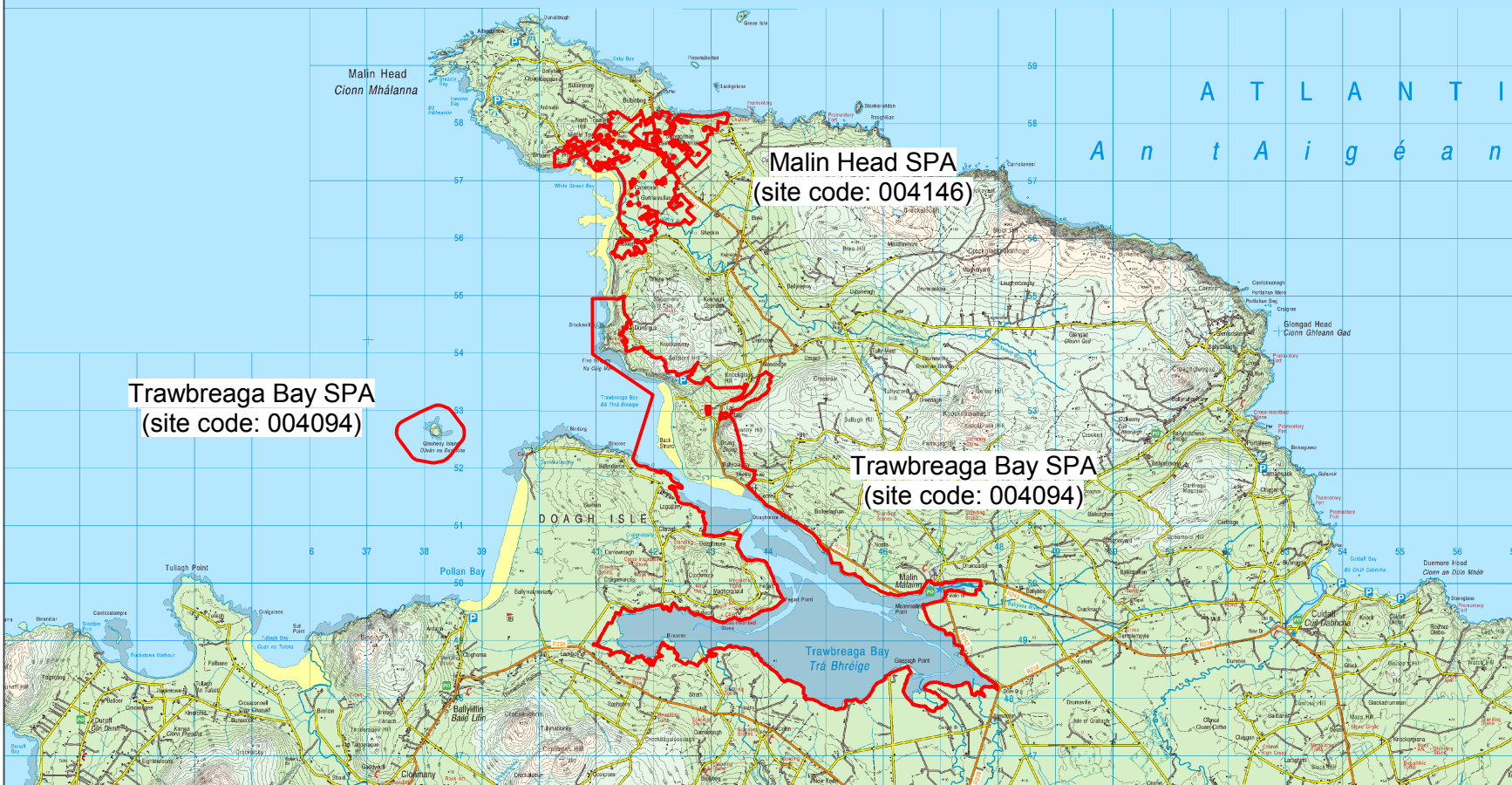
The Special Conservation Interest (QI) of Malin Head SPA is a breeding population of Corncrake (NPWS, 2020a; 2014h).

3.2.3.2. Conservation objectives

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.



Inishtrahull SPA
(site code: 004100)



Client:	Marine Institute		
Project:	Trawbreaga Bay SPA - AA		
Title:	SPAs within 15km of Trawbreaga		
Designed/Drawn:	Checked:	Authorised:	
POD	POD	POD	
Date: 18-03-2021	Date: 18-03-2021	Date: 18-03-2021	
Drawing No:	3.1		Rev: 1.0

ATKINS Dublin - Tel: 353 - 1 - 890 9000
Cork - Tel: 353 - 21 - 429 0300
Galway - Tel: 353 - 91 786050

3.3. Sites outside 15km of Trawbreaga Bay SPA

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.

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).

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

3.3.1.1. Special Conservation Interests

The Qualifying Interest (QI) 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, 2015c; 2014d/e).

In addition, the wetland habitat within Lough Foyle SPA is an additional Qualifying Interest (NPWS 2014d).

3.3.1.2. Conservation objectives

The overall conservation objective for the non-breeding populations of the Qualifying Interests in Lough Foyle is to maintain or restore the favourable conservation condition of the species (NPWS, 2014d). 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, 2014d).

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, 2014d].
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 (2014d).

Source: NPWS (2014d).

Attributes are not numbered in NPWS (2014d) but are numbered here for convenience.

3.3.1.3. Wetlands

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, 2014d).

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 (2014d/e).

3.3.2. Lough Foyle SPA (NI) (Site code: UK9020031)⁵

3.3.2.1. Qualifying Interests

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 Godwit⁶. 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 Greenshank. A notable wintering population of Slavonian Grebe also occurs.

The Qualifying 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 QI for Lough Foyle SPA in Northern Ireland is Greenshank and Mute Swan.

3.3.2.2. Conservation objectives

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,

⁵ Lough Foyle SPA (UK 9020031) – full details of this site in Northern Ireland can be found at - <https://www.daera-ni.gov.uk/publications/lough-foyle-special-protection-area>.

⁶ Lough Foyle Citation document - <https://www.daera-ni.gov.uk/sites/default/files/publications/doi/Lough%20Foyle%20SPA%20Citation%20documents%20and%20map.pdf>

- 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
 - maintain species diversity contributing to the waterfowl assemblage.

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.

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

3.3.3. Lough Swilly SPA (Site code: 004075)⁷

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

3.3.3.1. Qualifying Interests

The Qualifying Interests (QIs) 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.

In addition, the wetland habitat within Lough Swilly SPA is an additional Qualifying Interest.

3.3.3.2. Conservation objectives

The overall conservation objective for the non-breeding and breeding QI species populations is to maintain or restore the favourable conservation status of the species (NPWS, 2015d; 2011a/b).

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

⁷ 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 (2011a/b; 2015d).

Attributes are not numbered in NPWS (2011a) but are numbered here for convenience.

The favourable conservation conditions of breeding QI 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 QI 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 <i>et al.</i> , 1995). Mitchell <i>et al.</i> (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 <i>et al.</i> , 1995)
3 Distribution: breeding colonies	Distribution	No significant decline	The only known breeding site for Sandwich Tern is on Inch Island.

Source: NPWS (2011a); References quoted from NPWS (2011a).

Attributes are not numbered in NPWS (2011a) but are numbered here for convenience.

3.3.3.3. Wetlands

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, 2011a).

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 (2011a).

3.3.4. Fanad Head SPA (Site code: 004148)

3.3.4.1. Qualifying Interests

The Qualifying Interest (QI) of Fanad Head SPA is the breeding population of Corncrake (NPWS, 2020c).

3.3.4.2. Conservation objectives

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

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

3.3.5.1. Qualifying Interests

The Qualifying Interests (QIs) 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, 2014g; 2020d).

3.3.5.2. Conservation objectives

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

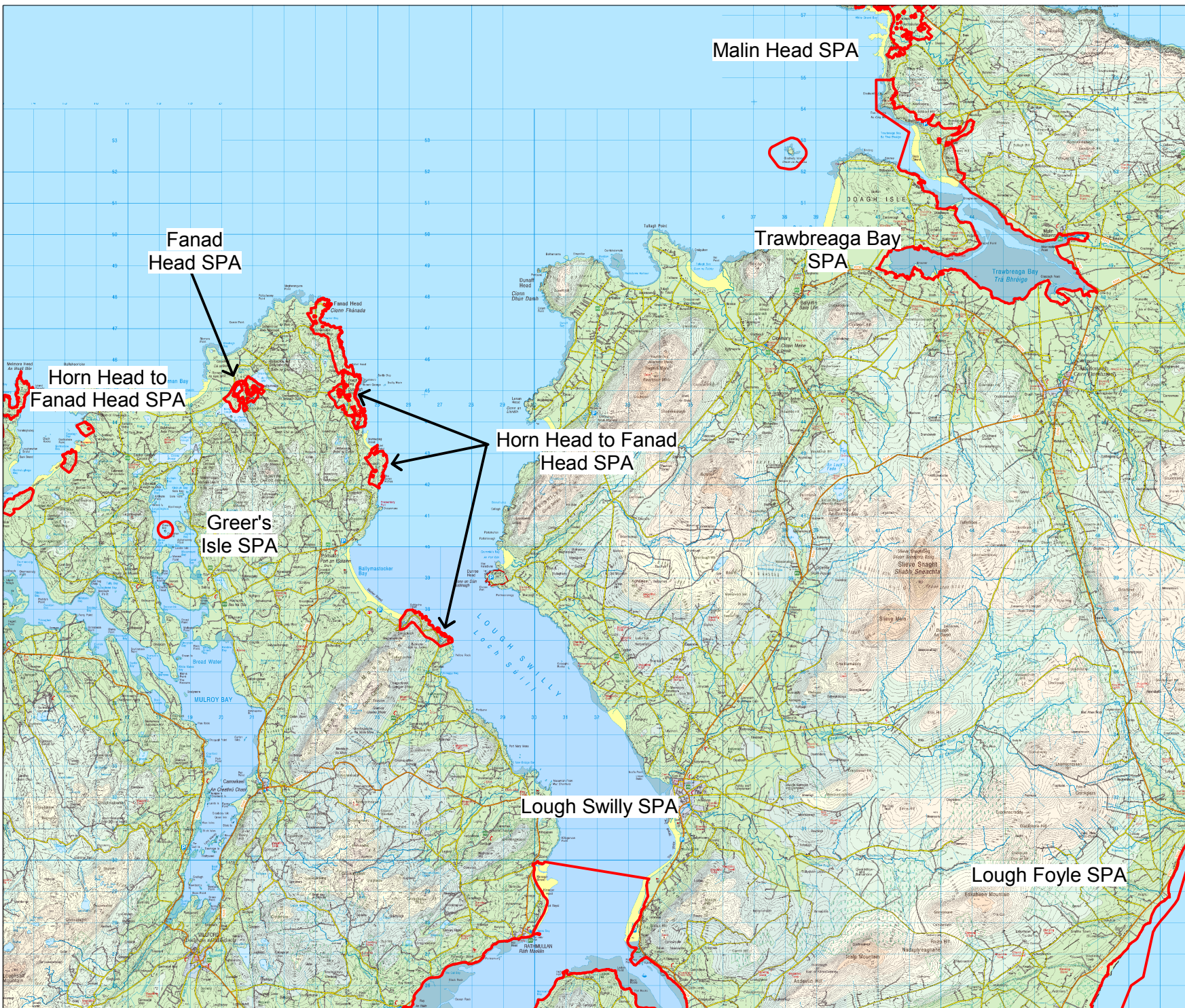
3.3.6. Greers Isle SPA (Site code: 004082)

3.3.6.1. Qualifying Interests

The Qualifying Interests (QIs) of the Greers Isle SPA include breeding populations of Black-headed Gull, Common Gull and Sandwich Tern (NPWS, 2010a; 2020e).

3.3.6.2. Conservation objectives

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



SPAs

Client:	Marine Institute		
Project:	Trawbreaga Bay SPA - AA		
Title:	SPAs >15km from Trawbreaga		
Designed/Drawn:	Checked:	Authorised:	
POD	POD	POD	
Date: 18-03-2021	Date: 18-03-2021	Date: 18-03-2021	
Drawing No:	Rev:		
3.2	1.0		

ATKINS Dublin - Tel: 353 - 1 - 890 9000
 Cork - Tel: 353 - 21 - 429 0300
 Galway - Tel: 353 - 91 786050

4. Appropriate Assessment Screening

4.1. Trawbreaga Bay SPA

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

4.2. Inistrahull SPA

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

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

Shag - 127 pairs bred at Inishtrahull in 1999; higher numbers bred in 1991/92 (500 pairs). In the 2015 & 2016 survey of cliff-nesting seabirds 90 occupied nests were recorded at Inistrahull (Newton *et al.*, 2015; NPWS *pers comm*). 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.

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.

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).

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.

Common Gull – 30 pairs of Common Gull were recorded as breeding on Inishtrahull in 1999; only 7 pairs were recorded in 2016 (NPWS *pers comm*). 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).

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.

4.3. Malin Head SPA

Malin Head SPA is designated for **Corncrake**. The Corncrake is included on the red list of Birds of Conservation Concern (Gilbert *et al.*, 2021) 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.

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

4.4. Lough Foyle / Lough Swilly

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.

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 for 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.

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

4.5. Fanad Head SPA

As for Malin Head SPA, Fanad Head SPA is designated solely for Corncrake (NPWS, 2014a; 2018c). 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.

4.6. Horn Head to Fanad Head SPA

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.

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.

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

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.

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 (5 pairs in 2002) (NPWS site synopsis; 2014g); 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.

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.

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).

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.

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) (counts from 1999; NPWS site synopsis, 2014g⁸). 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.

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

⁸ 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) (NPWS, 2014g).

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 Wikispace⁹). Therefore, the intertidal oyster cultivation area is within the potential foraging range of the SPA population but may only be a peripheral area.

In winter, Cormorant regularly occur within Trawbreaga Bay; in the NPWS waterbird survey programme 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.

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.

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.

4.7. Greers Isle SPA

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

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 63 pairs recorded in three subcolonies. This increase to 217 pairs in 2004 (along with small numbers of Common Tern and / or Arctic Tern) (NPWS site synopsis, 2010). 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.

Black-headed Gull – in 2002 Greers Isle supported ca. 200 breeding pair of Black-headed Gull (NPWS site synopsis, 2010). 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

⁹ <http://seabird.wikispaces.com/>

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.

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.

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.

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 Inishtrahull 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. Site Visit

The site was visited on the 10th and 12th February 2021 by Robert Vaughan (for Woodrow Environmental) on behalf of Atkins. The main objective was to undertake a survey of all proposed access points, while also recording the location of any Light-bellied brent geese and Barnacle geese feeding flocks.

5.1. Vantage Point Survey

The main objective was to undertake a survey of all proposed access points. The bay was viewed from a number of different points; as shown on Figure 6.1. The photos illustrate the condition of the shoreline close to proposed access points and areas of trestle activity.



Plate 5.1 View across Trawbreaga Bay from the R242 Malin Road (VP1).



Plate 5.2 View over Trawbreaga Bay from VP4, south of the R242 Malin Road.



Plate 5.3 View over trestles at VP4, south of the R242 Malin Road.



Plate 5.4 View from access road at Glassagh Point (VP6).



Plate 5.5 View over trestles at Glassagh Point (VP6).



Plate 5.6 View from Carndonagh (VP8).



Plate 5.7 View from access at Magheranaul (VP9).



Plate 5.8 View across trestles off Magheranaul (VP9).



Plate 5.9 View from access at Fegart (VP10).



Plate 5.10 View from access at Doaghmore (VP11) eastwards towards sheds adjoining R242.

A number of points to emerge from the site visit is the presence of unused bags and trestles on the foreshore (see Plate 5.5).

5.2. Feeding Flocks

While the survey of geese in Trawbreaga Bay should not be viewed as a comprehensive, co-ordinated survey of the Bay for geese, during the course of the site survey the location of flocks of Barnacle geese and Light-bellied brent geese was noted. Counts were undertaken on the 10th and 12th February 2021. Observations are summarised in Table 5.1.

Table 5.1 Counts of Barnacle Geese and Light-bellied brent geese (10th and 12th February 2021).

No.	Species	Date	Time	Count	Behaviour	Notes	X	Y
10/02/21								
1	Brent geese	10/02/2021	11:20	58	Forage		-7.31628	55.30538986
2	Brent geese	10/02/2021	11:20	37	Roost	Also preening, includes 8 birds that flew in from east	-7.30562	55.30528432
3	Brent geese	10/02/2021	11:20	21	Forage	Spread out, 7 forage close to trestles	-7.30323	55.30465645
4	Brent geese	10/02/2021	11:20	14	Forage		-7.29596	55.2921634
5	Brent geese	10/02/2021	11:29	21	Fly-land	Flew in and land in and amongst trestles	-7.29955	55.30083826
6	Barnacle geese	10/02/2021	12:07	46	Fly	12:07 end point (last seen)	-7.28824	55.27480552
7	Barnacle geese	10/02/2021	11:52	6	Forage		-7.2743	55.27795821
8	Barnacle geese	10/02/2021	12:01	250	Fly	Picked up at this point - flew west	-7.31164	55.28829627
9	Barnacle geese	10/02/2021	13:46	2350	Forage	Flock approximately 2,350 birds feeding in tight flock, approx. half flew north east after circling for 10 mins at 13:50	-7.36183	55.28627722
<p>Note: A repeat count was undertaken at 13:10 (-7.30666; 55.30004159); 76 brent geese were observed foraging (spread out through the area as shown in Figure 5.1).</p>								
12/02/21								
10	Barnacle goose	12/02/2021	12:05	1536	Forage	Foraging in a tight flock	-7.36183	55.28627722
11	Barnacle goose	12/02/2021	12:12	670	Forage	Also, some roosting and preening - c. 200 flew in from previous count - spread across wide area over two fields	-7.35498	55.29089235
12	Barnacle goose	12/02/2021	12:40	70	Forage	Feeding and roosting	-7.34937	55.29110426
13	Brent geese	12/02/2021	13:14	13	Flying	Flushed out of area by workers, 26 wigeon flew off also	-7.31852	55.28828883
14	Brent geese	12/02/2021	13:20	2	Forage	2 remained feeding after 13 flushed by bait digger	-7.31889	55.28885185
15	Brent geese	12/02/2021	13:53	3	Forage		-7.27483	55.28081486
16	Brent geese	12/02/2021	14:08	19	Forage	3 preening in river, rest feeding along shore	-7.31376	55.30951885
17	Brent geese	12/02/2021	14:09	36	Forage		-7.31409	55.30557306
18	Brent geese	12/02/2021	14:17	9	Forage		-7.306	55.30387208

The total number of geese counted on the 10th February 2021 amounted to 2,650 Barnacle geese and 151 Light-bellied brent geese. Barnacle geese numbers were dominated by a single large flock of 2,350 birds on the 10th February 2021 (Figure 5.1). Brent geese were found in scattered small flocks predominantly off the south and east Coast of Doagh Island.

The total number of geese counted on the 12th February amounted to 2,479 Barnacle geese and 82 Light-bellied brent geese. Barnacle geese numbers were divided into three flocks in Ballyliffin; a single large flock of 1,536 birds north of Lackboy / R268; 670 further north (across two fields), as well as a smaller flock of 70 birds) (Figure 5.2). Brent were again geese were found in scattered small flocks predominantly off the south and east Coast of Doagh Island, with small numbers also seen off Glassagh Point on the 12th (refer to Figure 5.2).

While all the Barnacle geese were feeding on areas of improved grassland (farmland), Light-bellied brent geese were observed along the shore. It should be noted, however, that Light-bellied brent geese have also been recorded field feeding (see e.g. Plate 5.11).



Plate 5.11 Light-bellied brent goose feeding on grass near VP6 (Glassagh Point).



Plate 5.12 Barnacle geese on grass - alert.



Plate 5.13 Barnacle geese on grass – actively feeding.

5.3. Ringed Birds

Both Barnacle geese and Light bellied brent geese have been ringed with both metal rings and plastic darvic rings in Trawbreaga Bay. The darvic rings are a combination of three letters / numbers in black on a white ring placed on the left leg; allowing birds to be individually identified. One bird also carried a red ring on its right leg. Records of darvic rings recorded during the site visits have been forwarded to the Scheme Co-ordinator.

On the 12th February a large number of ringed Barnacle geese were observed in the fields in Ballyliffin (north of Lackboy / R268.). Fourteen rings were read; along with one additional putative read. On the 12th a further six darvic rings were read; while a single additional ring was read on a bird feeding near Carnmalin, Malin Head. All records have been forwarded to the scheme co-ordinator.

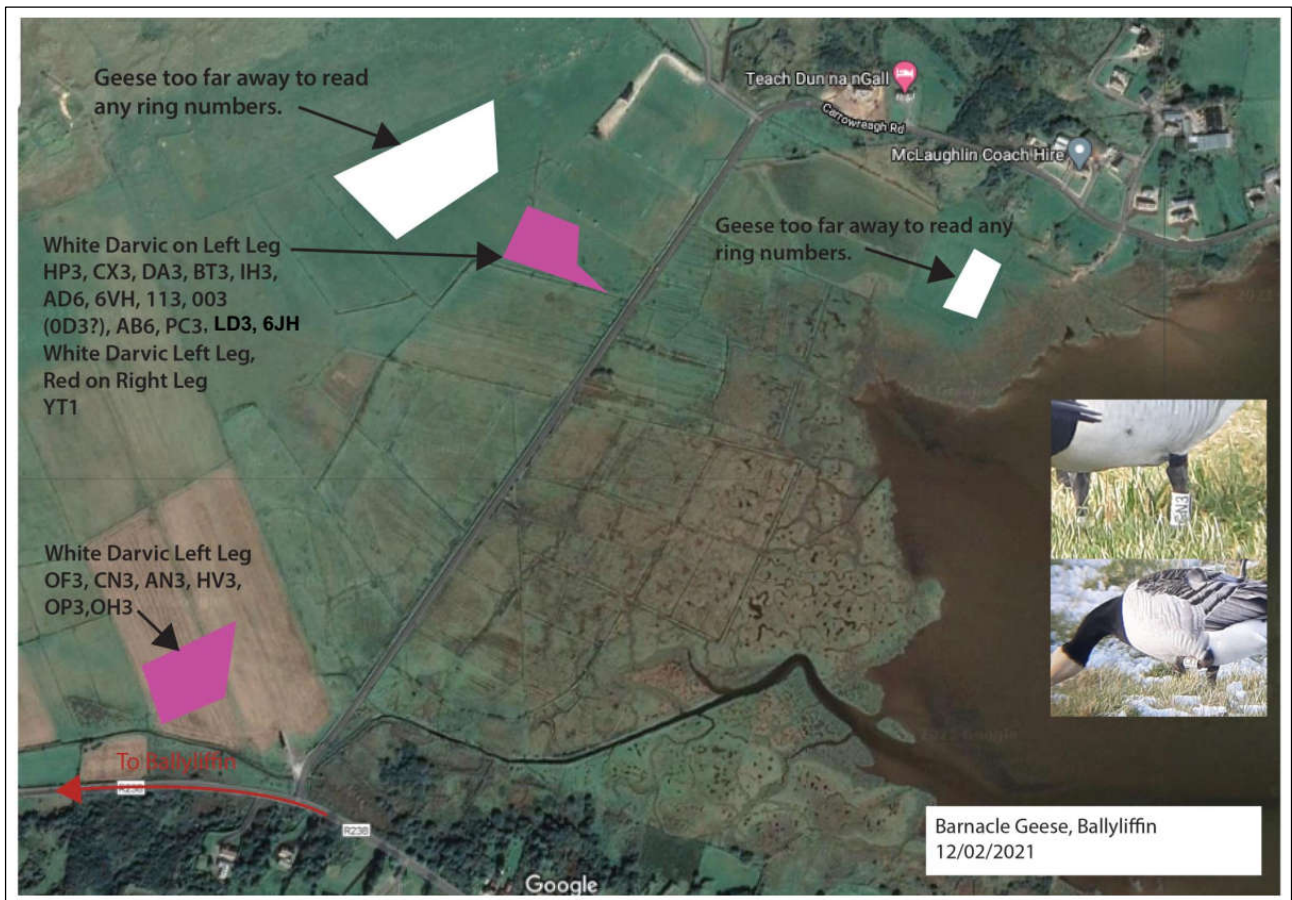


Figure 5.1 Barnacle goose darvic rings read at Ballyliffin on the 12th February 2021.

A full listed of rings read is presented below.

Field 1 (north)

White darvic on left leg		
HP3	AD6	AB6
CX3	6VH	PC3
DA3	113	6JH
BT3	003	LD3
IH3	(OD3?)	
White darvic on left leg; red on the right		
YT1		

Field 2 (south)

White darvic on left leg
OF3
CN3
AN3
HV3
OP3
OH3

6JY was observed in Carnmalin, close to Malin Head.

- Ground Locations**
1. 58x Brent goose Feeding
 2. 37x Brent goose Roosting
 3. 21x Brent goose Feeding
 4. 14x Brent goose Feeding
 5. 76x Brent goose Feeding
 6. 21x Brent goose Landed
 7. 6x Barnacle goose Present
 13. 2350x Barnacle goose Feeding

- Flightlines**
1. 21x Brent goose Flying to landing
 2. 46x Barnacle goose Flying
 3. 250x Barnacle goose Flying
 5. 1175x Barnacle goose Flying

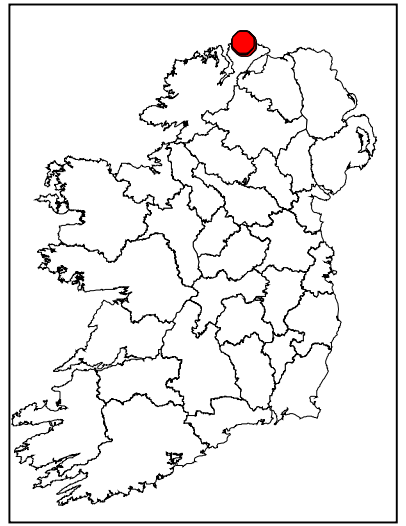


Legend

- Vantage Point Locations
- Goose Flightlines
- Goose ground locations

Aquaculture Sites

- Application
- Licensed



Client: Marine Institute		
Project: Trawbreaga Aquaculture AA		
Title: Goose species flightlines and ground locations 10.02.21		
Drawn: EN	Checked: NS	Authorised: POD
Date: 24/05/2021	Date: 24/05/2021	Date: 24/05/2021
Drawing No: 5.1		Rev: 1.1
ATKINS		Dublin - Tel: 353 -1 - 890 9000 Cork - Tel: 353 -21 - 429 0300 Galway - Tel: 353 - 91 786050

Ground Locations






- 8. 36x Brent goose Feeding
- 9. 21x Brent goose Feeding
- 10. 9x Brent goose Feeding
- 11. 3x Brent goose Feeding
- 12. 2x Brent goose Feeding
- 14. 370x Barnacle goose Feeding
- 15. 300x Barnacle goose Feeding
- 16. 70x Barnacle goose Feeding and roosting
- 17. 1536x Barnacle goose Feeding

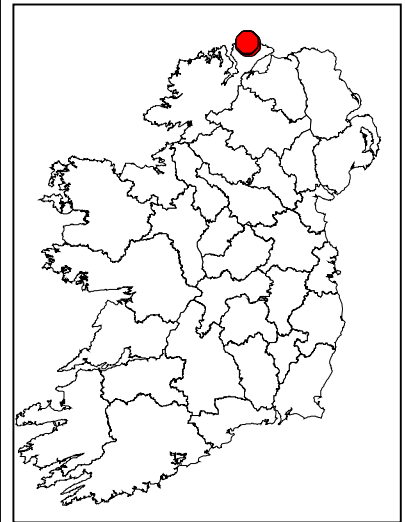
Flightlines

- 4. 13x Brent goose Flushed



Legend

-  Vantage Point Locations
-  Goose Flightlines
-  Goose ground locations
- Aquaculture Sites**
-  Application
-  Licensed

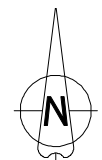
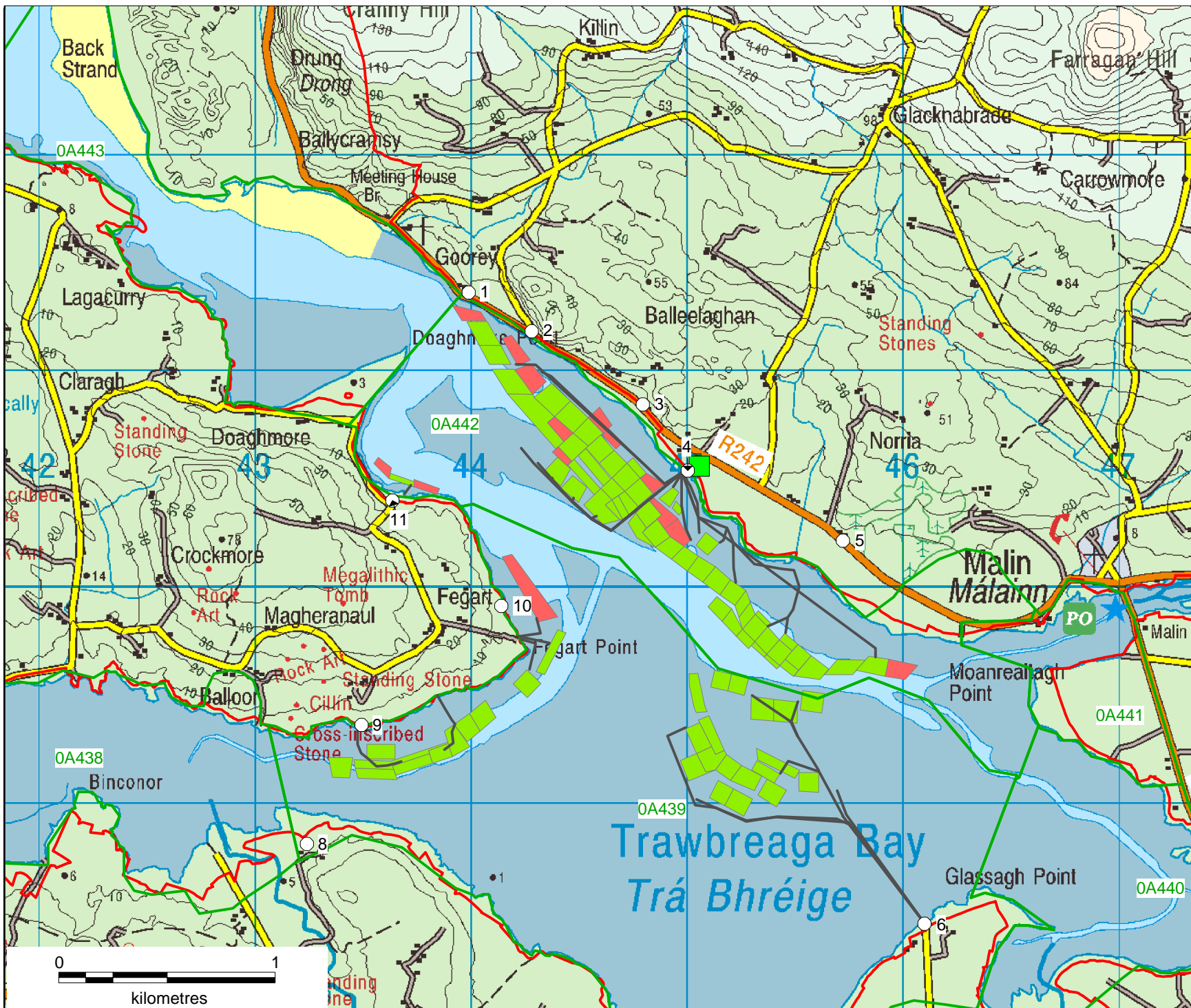


Client: Marine Institute		
Project: Trawbreaga Aquaculture AA		
Title: Goose species flightlines and ground locations 12.02.21		
Drawn: EN	Checked: NS	Authorised: POD
Date: 24/05/2021	Date: 24/05/2021	Date: 24/05/2021
Drawing No: 5.2		Rev: 1.1


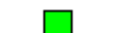





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Table 6.1 Details of proposed Aquaculture Sites.

Applications Numbers	Area (sq. m)
T12/554A	10080.03432
T12/555A	23028.9098
T12/557A	7482.05659
T12/558A	6957.525421
T12/560A	8987.984145
T12/561A	5719.520555
T12/562A	3513.998471
T12/563A	3594.499687
T12/566A	6344.996748
T12/568A	3667.381086
T12/570A	3067.288154
T12/571A	4833.004553
T12/572A	7750.500654
T12/573A	6304.992268
Total area (ha)	10.13 hectares



Legend

-  Access
-  Proposed Sheds
- Aquaculture Sites**
-  Application
-  Licensed
-  Trawbreaga Bay SPA
-  IWeBS sites
-  Vantage Point Locations

Client: Marine Institute

Project: Trawbreaga Bay SPA - AA

Title: Aquaculture Sites & Access Lanes

Designed/Drawn: POD	Checked POD	Authorised: POD
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Date: 24/05/2021	Date: 24/05/2021	Date: 24/05/2021
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Drawing No: 6.1	Rev: 1
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6.1.2. Background

The Trawbreaga Bay CLAMS* Group was established in 2006 and is composed of representatives for most of the oyster producers in the bay. The CLAMS group meet approximately three times a year, and in response to issues arising in the bay or the area which require that the aquaculture sector is informed or have an input into their address. Louise Collins, BIM is the local CLAMS liaison officer for the group.

Oyster farming brings in a lot of employment and wealth into the region of the Northwest, where emigration has greatly affected the local population, and this wealth has had a knock on for the wider economic benefit of the area.

All of these sites are operated by local people that are working and living in the area. Exports from Trawbreaga Bay were in excess of €1.5 million in 2018, and employment was in the region of 70, between part time and full time.

The oyster farms in Trawbreaga Bay are mainly 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.

These sites are all very close in distance from one another, and all the sites in Trawbreaga are small sites, usually one hectare to two hectares.

In recent years operators in Trawbreaga Bay have faced many challenges in farming their oysters. In 2011, many oysters were lost in the Red Tide. The following year a lot of mortality was due to a viral outbreak. There were also problems with sanding and silting, causing sites to “shift” and making some areas unworkable as trestles would sink and tractors would not be able to access them, so the farmers preferred to move there farming operations onto higher shores so to make sure there was firmer substrate. These shifts in site location are reflected in some of the licence renewal applications.

6.1.3. Production Cycle

6.1.3.1. Source of Seed

The oyster seed is bought in from oyster nurseries in France or the UK. The following seed has been used in the Bay: -

- GrainOcean
- France Turbot
- Satmar
- France Nissian

These seed start off very small going down to just to 4- 6 mm in size.

Oysters in Trawbreaga Bay are grown in trestles and bags.

The typical trestle method is constructed of 16mm steel bar with plastic oyster bags secured on top. Trestles are 0.6m high with a width of 1.3m at the base tapering to 0.8m at the top. Oyster bags are placed length ways across the trestles at a width of 1m. Trestles are arranged in rows of up to 100m in length to fit within the licence area and rows are spaced 4m apart. The trestles are located at low water Spring tides and so are only accessible or visible during the latter period of low water when this occurs in daylight hours.

6.1.3.2. Stocking densities and grading and harvesting

Seed is brought to the service site (see Figure 6.1) either in spring or late summer of each year, typically at an intake size of 6 - 10mm. These are packed in oyster bags at a predetermined density and taken to the inter-tidal zone, where the bags are attached to trestles for the growing process to begin.

The mesh size in the bag varies according to what seed is grown. For example, 6mm seed is put into 4mm mesh bags at a ratio of 1,000 to 1,500 seed per bag.

Oysters are thinned out and graded as the oysters grow. As the oysters grow, they will be taken to the handling / sorting facility (service site; see Figure 6.1) 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. Some farmers take in half grown oysters and contract grow these for local farmers in the area.

The intertidal area is 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.

Any oysters that die in the inter-tidal area typically degrade rapidly. Empty shells are retained on-site and spread on the ground.

6.1.3.3. Turning Oyster Bags

Producers generally turn each bag on site once a month. Turning takes place when the oysters are growing. This means turning takes place from March up to October/November depending on growth. Both spring tides of each month will be used by producers to get out to their sites.

6.1.3.4. Access Route

Trestles will be access from a number of different areas around the bay. The main access point is from the Malin Road / R242 on the north side of the bay (at VP4 as described in Chapter 5.0). This is also the site of Sheds / process area. From here vehicles travel east and west along the shoreline to access trestles. Information is not available on the number of vehicles that might be on the shore at any one time or the number of days in which there is shoreline activity. This area include sites which are Licenced, Under Appeal and New Applications (see Figure 6.1).

On the southern side of the bay, the main access point is at Glassagh Point (at VP6 as described in Chapter 5.0). This area include sites which are Licenced and Under Appeal (see Figure 6.1). There are no new Applications in this area.

To the west, off Doagh Island there are a number of different access points; at Magheranaul; Fegart and Doaghmore (i.e. at VP9, 10 & 11 as described in Chapter 5.0). Those access from Magheranaul are Licenced and Under Appeal (see Figure 6.1). There are Applications for new sites off Fegart and Doaghmore, as shown on Figure 6.1.

In all of these cases information is not available on the number of vehicles that might be on the shore at any one time or the number of days in which there is shoreline activity.



Plate 6.1 – Example of an Oyster bag on a trestle.

6.2. Potential Impacts

6.2.1. Ecosystem effects

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, 2014c).

The area of existing licenced aquaculture activities is 46.55ha; while a further 14.59ha have been progressing through the appeal process; giving a total of 61.14ha currently being operated. To date 15 of 19 sites have been approved. These sites are all currently in operation and therefore are considered as part of the existing environment (see Figure 6.1); these are discussed further under In-Combination Impacts (Chapter 7.0).

As noted there are current applications for a further 10.13ha dispersed across 14 plots (see Figure 6.1).

There are 10.13ha of applications across 14 plots. Within the bay current and proposed licence blocks are centred on IWEBS subsites 0A439 and 0A442 (Figure 6.2). All but one of the current applications falls within the IWEBS count sector 0A442 (7.83ha). A single large site to the north of Fegart Point falls within IWEBS subsite 0A439 (2.30ha).

Both areas are characterised by intertidal, shallow subtidal and subtidal habitats. In the case of Light-bellied brent geese, they are capable of reaching approximately 40 cm below surface when upending and therefore can make use of shallow subtidal waters as the tide is changing (Clausen, 2000); as well as grazing on terrestrial grassland. While Barnacle geese may occasionally roost on intertidal areas or access freshwater creeks in such areas they feed exclusively on neighbouring grassland and roost on an offshore island.

The approximate area of intertidal habitat (i.e. equivalent to mudflats and sandflats not covered by seawater at low tide 1140) is 395.42ha in subsites 0A439 and 151.37ha in subsite 0A442. The area of subtidal habitat is 27.57ha and 87.83ha, respectively. Table 6.2 sets out the area of proposed trestles within intertidal and subtidal habitat for IWEBS subsites 0A439 and 0A442.

Table 6.2a Area of aquaculture sites in intertidal and subtidal habitat for IWEBS subsites 0A439 and 0A442.

Category	Intertidal (hectares)	Subtidal (hectares)
Total Area in SPA	827	314
0A439		
Total Area	395.42	27.57
Applications	2.31	0.77
%	0.58%	2.8%
0A442		
Total Area	151.37	87.83
Applications	10.80	1.41
%	7.13%	1.61%

Table 6.2b Area of aquaculture sites in intertidal and subtidal habitat as a function of the entire SPA.

Category	Intertidal (hectares)	Subtidal (hectares)
Total Area in SPA	827	314
Application Areas	13.11	1.09
	1.59%	0.35%

There are no applications within IWEBS subsites 0A440 and 0A441 at the far eastern end of the site; or in 0A438 on the western side of the bay.

Given the 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.

6.2.2. Habitat structure

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.

6.2.3. Food resources

6.2.3.1. Benthic fauna

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

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.

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 of 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 guilliamsoniana*, *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.

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).

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 quite substantial in autumn when birds first arrive.

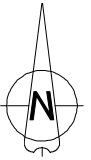
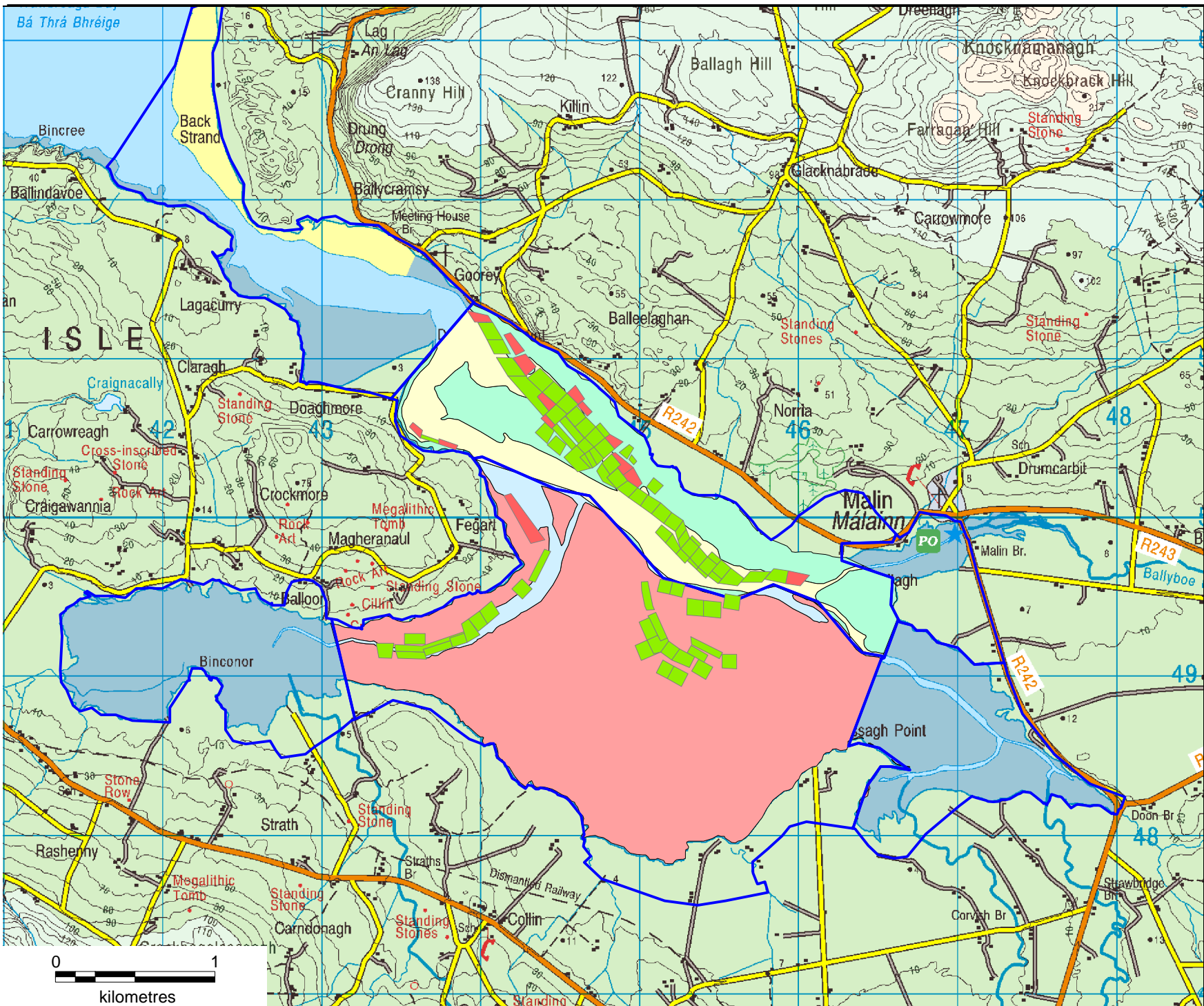
6.2.3.2. Disturbance

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.

Aquaculture husbandry activities were amongst five different activities that were recorded to cause disturbance to waterbirds at Trawbreaga Bay during the NPWS waterbird survey programmes 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, 2014c).

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, 2014c).

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.



Legend

- Aquaculture Sites
- Application
- Licensed
- IWeBS sectors

Subsite 0A442

- Subtidal
- Intertidal

Subsite 0A439

- Subtidal
- Intertidal

Client: Marine Institute			
Project: Trawbreaga Bay SPA - AA			
Title: Areas of Intertidal & subtidal habitat in IWeBS count sectors			
Designed/Drawn: POD	Checked: POD	Authorised: POD	
Date: 24/05/2021	Date: 24/05/2021	Date: 24/05/2021	
Drawing No: 6.2			Rev: 1

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6.3. Assessment of QI Species in Trawbreaga Bay SPA

6.3.1. Chough

6.3.1.1. Status of Chough

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).

Chough is amber listed on the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021). 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.

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 (2014b). More recently 53 birds were observed at Lagg, Malin Head in October 2014, while a flock of over 100 birds was noted near Horn Head (source: www.irishbirding.com).

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

A tender for undertaking new national survey of Chough in 2021 was advertised by National Parks and Wildlife Service of Department of Housing, Local Government and Heritage in February 2021, with the survey to be undertaken over the summer of 2021.

6.3.1.2. Distribution of Chough in Trawbreaga Bay

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, 2014b).

6.3.1.3. Response of Chough to oyster trestles

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.

6.3.1.4. Impact Assessment - Chough

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.

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).

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).

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).

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

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.

6.3.2. Barnacle Goose

6.3.2.1. Review of Barnacle Goose counts

The Greenland breeding population of Barnacle Geese that over winter in Ireland and Britain was increasing in numbers (Mitchell *et al.* 2008) with a total wintering population estimated at 80,670 birds (Mitchell and Hall, 2013; see also Doyle and McMahon, 2017). This figure is based on the results of a 2013 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 represented a total wintering population increase of 14.4 percent since the previous survey in 2008 (Mitchell and Hall, 2013).

The results of the 2013 recent census suggested 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 showed 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 2013 survey (Crowe *et al.* 2014).

Notably, Mitchell and Hall (2013) 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 2013 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.

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

When counted in 2018 a total count of 72,162 represented a 10.5% decrease since the population was last censused in 2013. In Ireland, 16,237 birds were counted; this represented a 7.2% decline in numbers since 2013 and is in line with a recent flyway population decline (Doyle *et al.*, 2018; Mitchell, 2018). Trawbreaga Bay continues to support an internationally important population, with 1,775 birds recorded in the 2018 census (Doyle *et al.*, 2018). This national decline must, however, be viewed in the context of a control programme being implemented in Islay since 2014. Doyle *et al.* (2018) noted that there may have been a decrease in Barnacle Goose immigration into Ireland from Islay (Scotland) due to the shooting control programme for Barnacle Geese currently being implemented on Islay as part of the *Islay Sustainable Goose Management Strategy, 2014-2024* (MacKenzie, 2014). A similar scale of decline has been seen in Scotland indicating a reduction at a flyway level rather than a redistribution of birds away from Irish sites.

Barnacle Goose is amber listed on the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021). While numbers at the time were increasing for this species, it was retained 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.

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.

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 is 810 birds, while the threshold for national importance is 160 birds (Lewis *et al.*, 2018).

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, 2014b) and may move between the sites. A summary of counts from different sources, including IWEBS are shown in Table 6.3 and 6.4.

Table 6.3 Summary population data for Barnacle Goose at Trawbreaga Bay (multiple sources).

Survey	Numbers recorded
Data from Crowe, 2005 (5-year averages)	1994-1998; 663 1995-199; 645 1999-2000; 621
Baseline period from IWEBS (Mean Peak 1995/96 to 1999/00) (Natura 2000 form)	645 (I)
1999 Spring census	217 (N)
2003 Spring census	254 (N)
2008 Spring census *	317 (N)
November 2009 (WSP, NPWS)	Peak - 2,194 (I) Average – 714 (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)
2018 Census (Doyle <i>et al.</i> , 2018; Lewis <i>et al.</i> , 2019)	1,775 ¹⁰
Incidental records (www.irishbirding.com)	
- Lagg (1 st January 2017)	1,500 +
- Near Malin Town (18 th Feb 2015)	ca. 2,000
- Between Malin & Malin Head (14 th Oct 2014)	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	

Table 6.4 Summary of notable counts from IWEBS.

Date	Count	IWEBS subsite
25/01/18	420	0A443
21/11/12	518	0A442
28/02/12	1300	0A438
14/11/10	660	0A439
02/03/10	510	0A439
22/01/09	760	0A402 ^a
25/11/08	1328	0A402
06/02/08	1943	0A402
16/12/07	2355	0A402

^a 0A402 refers to when IWEBS counted Trawbreaga as a single site (no subsites).

The site conservation condition for Barnacle Goose at Trawbreaga Bay SPA has been assessed as favourable based on the increasing population (NPWS, 2014c).

¹⁰ During the 2018 census, in addition to 1,775 birds at Trawbreaga, a further 380 birds were recorded at Malin and 300 at Doagh – giving a combined Trawbreaga / Malin population of 2,455. This is in line with recent high counts from Trawbreaga.

6.3.2.2. Recent Barnacle Goose Counts

Trawbreaga Bay and the nearby Malin Head were counted by NPWS in March 2020 (Lee McDaid, NPWS, *pers comm*). On the 16th March 2020 the following flocks were recorded, giving a total of 1,265 birds in Trawbreaga Bay (see Figure 6.3): -

- 30 Balloor, Doagh Island
- 340 Strath
- 105 Glassagh
- 790 Doon Bridge

On the 12th February 2021 (during a recent IWEBS count) 1,670 Barnacle geese were counted on IWEBS subsite 0A439 (southern bay) and 21 in subsite 0A440 (eastern bay); see Figure 2.2 for subsite boundaries. A further 870 were recorded on the same day below the tower at Malin Head. This makes a total of just over 2,500 Barnacle geese for North Inishowen and is consistent with the large numbers NPWS have seen this year (NPWS, *per comm*). On the 28th November 2019 1,380 Barnacle geese were recorded in 0A438 (see Figure 2.2; subsite adjoins Ballyliffin fields and south side of Doagh Island).

As noted, the site was surveyed by Atkins on the 10th and 12th February 2021 (see Chapter 5.0). The total number of Barnacle geese recorded using Trawbreaga Bay and environs was 2,350 on the 10th and 2,479 on the 12th February. Location of flocks is shown in Figure 5.1 and 5.2.

The species is primarily a land-based bird, foraging terrestrially while roosting can occur on sandbanks, saltmarsh and offshore islands (NPWS, 2014b/c). Glashedy Island is used as an overnight roost.



Figure 6.3 Location of barnacle geese flocks, 16th March 2020 (Source: L. McDaid, NPWS).

[Note: In each case the count value is placed over the field used by foraging Barnacle geese]

In earlier versions of this Appropriate Assessment Report a number of figures were included which summarised the distribution of geese in Trawbreaga Bay; this included data from 2007/2008 (Source: E. Johnston, NPWS) and 2009/2010 (Source: NPWS); along with a summary of areas favoured by geese (Source: NPWS). However, these data are now over 10 years old.

Figure 6.4 therefore illustrates the location of many areas favoured by Barnacle geese in Trawbreaga Bay in recent years; it should not, however, be viewed as an exhaustive list of sites (Source: Lee McDaid, NPWS, *pers comm*). To this we have added fields for which there is historic evidence of use by Barnacle geese in order to present a more complete picture of site use by Barnacle geese in Trawbreaga.

In summary, the site conservation condition for Barnacle Goose at Trawbreaga Bay SPA continues to be positive.

6.3.2.3. Trends

The population trend for Barnacle Goose presented in NPWS (2014b) 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 during this period. As a result, the site conservation condition for Barnacle Goose at Trawbreaga Bay SPA was assessed as favourable based on the increasing population (NPWS, 2014c).

During the NPWS waterbird survey programme in 2009/2010, a peak count of 2,194 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.

However, as noted above recent NPWS counts in February 2021 noted just over 2,500 Barnacle geese for North Inishowen and is consistent with the large numbers NPWS have seen this year (NPWS, *per comm*). The trend seems to be a significant increase in Barnacle Goose numbers in Trawbreaga Bay. In response to this increase NPWS have responded by offering Farm Plans to some of the local landowners. While in February 2021 NPWS noted geese distributed between Trawbreaga and Malin, in March 2021 Atkins noted 2,350 on the 10th and 2,479 on the 12th February 2021; all within Trawbreaga.

Lewis *et al.* (2019) indicates that Barnacle geese numbers rose by 101.1% over 25 years; +32.7% over 10 years; but there has been a slight decline of -7.2% over the most recent 5 years (2013 census; Crowe *et al.*, 2014). Trawbreaga is clearly identified as a site of International importance. The nearby site at Dunfanahy is also noted to be of national importance.

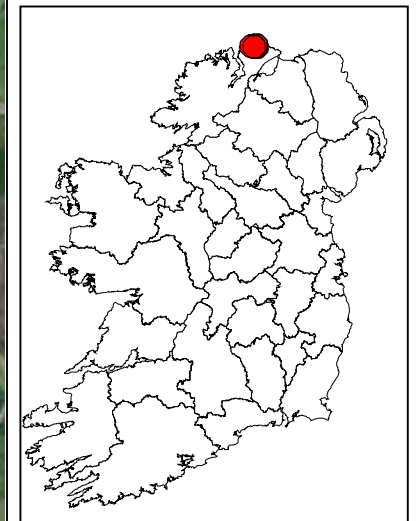
Barnacle Geese utilising sites at Lissadell and Ballintemple in Drumcliff Bay, Co. Sligo, the Inishkea Islands, Co. Mayo and Rathlin O'Birne Island, Co. Donegal show consistent site usage. In other locations, site usage is less consistent and may depend on food availability, disturbance and weather conditions 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 is clearly closely linked with the wider Malin flock and should be considered as a single unit. Barnacle Goose is not, however, a qualifying interest of the neighbouring Malin Head SPA (designated solely for Corncrake). Movements between Ireland and Islay (Scotland) have also been recorded.

The evidence from all available counts indicates that the site conservation condition for Barnacle Goose at Trawbreaga Bay SPA is favourable at present.



Legend

- Important On-Land Barnacle Goose Areas (NPWS, 2020)
- Additional Important Barnacle Goose Areas (NPWS, 2007/08; 2009/10)



Client: Marine Insistute

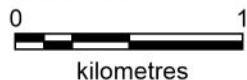
Project: Trawbreaga Bay SPA - AA

Title: Overview of Important On-Land Barnacle Goose Areas

Drawn: EN	Checked: NS	Authorised: POD
Date: 31/03/2021	Date: 31/03/2021	Date: 31/03/2021
Drawing No: 6.4		Rev: 1.0

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6.3.2.4. Other SPAs which support Barnacle Geese

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 6.5).

- 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, 2015b). 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. Inishtrahull 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; in the 2018 census 1,300 Barnacle geese were recorded (Doyle *et al.* 2018).
- 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). In the 2018 census 380 Barnacle geese were recorded at Malin Head (Doyle *et al.* 2018).

Table 6.5 Summary population data for Barnacle Goose at Trawbreaga Bay & Environs (after Crowe *et al.*, 2014, Doyle *et al.*, 2018).

Site	SPA	2013 Census Numbers recorded	2018 Census Numbers recorded
Inishtrahull	Inishtrahull SPA	n/a	n/a
Dunfanaghy New Lake	Horn Head to Fanad Head SPA	1,215	1,300
Trawbreaga	Trawbreaga Bay SPA	890	1,775
Malin Head	-	1,800	380

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

- It would therefore appear that Trawbreaga / Malin supports ca. 2,500 – 3,000 Barnacle Geese; with a further ca. 1,200-1,300 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, Inishdooney & Inishbeg SPA; with a further 318 from Inishsirr within West Donegal Islands SPA. Numbers at Inishsirr are also increasing – 62.2% since 2008 (no figure is available for Inishbofin, Inishdooney & Inishbeg). To the east there are no SPAs in Northern Ireland for which Barnacle Goose is a qualifying interest. A colour-ringing scheme is ongoing; this will help 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. The ongoing cull in Scotland further increases the importance of such studies.

6.3.2.5. Distribution of Barnacle Goose in Trawbreaga Bay

Barnacle Geese are predominantly terrestrial grazers and forage within coastal grassland and saltmarshes. During the NPWS waterbird survey programme at Trawbreaga Bay (surveyed in 2009/10), 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, Barnacle Geese were occasionally recorded roosting in the intertidal area at the southeast of the bay. Notably, the areas of terrestrial grassland in which the flocks were recorded are largely outside the SPA boundary (NPWS, 2014c).

In addition to observations of foraging birds, two observations of roosting geese in the intertidal area were made during the 2009/2010 surveys (flocks of 20 and 60 birds in 0A440). 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. This is generally used if birds are disturbed or where birds might be accessed freshwater in creeks running across the estuary.

As the winter of 2009/2010 was exceptionally cold the prevailing weather could have influenced 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 based on surveys undertaken in 2007/08 as well as sketch maps showing important Barnacle Geese areas in the bay based on accumulated personal observations at the time. These were included in full in earlier versions of this Appropriate Assessment. In the current version they have been assessed against more recent observations (see Figures 5.1; 6.2 and 6.3).

Thus, in summary, current understanding of spatial distribution is summarised in Figures 5.1; 6.2 and 6.3. As can be seen Barnacle geese can be found widely throughout the bay, but certain areas are certainly favoured. This includes Ballyliffin; fields south and west of Malin

In summary; based on all of the information available, favoured terrestrial foraging habitats include the improved grassland fields at Ballyliffin; areas of Doagh Island such as Magheranaul; Strath and Glassagh eastwards to Doon Bridge; fields south and west of Malin village; and Moanrealtagh Point. Recent observations highlight the importance of the Ballyliffin area – see Figure 5.1.

6.3.2.6. Response of Barnacle Goose to oyster trestles

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.

Displacement of birds from feeding areas and roost sites is an important consideration, as Barnacle geese tend to congregate in large numbers at favoured feeding and roosting sites in winter year on year; such sites frequently may be associated with a SPA, but often lie outside the site boundaries. It has been demonstrated in the literature that habitat quality on the wintering grounds can influence factors such as time of migration, body condition during spring migration and subsequent breeding success. As a consequence, loss of feeding areas or roosting sites through disturbance is of concern, especially if birds are forced to move to suboptimal sites.

It is difficult to find clear published evidence of disturbance / flight initiation distances for Barnacle Geese in the literature appropriate to the type and scale of disturbance associated with aquaculture activities. Hötker *et al.* 2006 (in Rees, 2012) quote displacement distance from feeding areas and roost sites 30–600 m for geese at terrestrial wind farms; while Madsen *et al.* (2009) found on Svalbard that during brood rearing, families of Barnacle geese escaped from disturbance from tourists on foot at an average distance of 330m. However, neither example is directly comparable to the situation in Trawbreaga, where the landscape includes ongoing low levels of disturbance from farming practices, nearby farmyards and houses and traffic on local roads. Clearly there is a degree to which Barnacle geese habituate to patterns of disturbance in the wider landscape, with e.g. existing trestles close to shoreline feeding fields off the R242 and at Magheranaul.

6.3.2.7. Impact Assessment – Barnacle Goose

As noted, Figure 5.1, 5.2 & 7.2 illustrates the area of fields and adjoining shore generally favoured by Barnacle Geese (cumulative data from multiple sources). Recent counts have highlighted the importance of Ballyliffin – with over 2,000 birds recorded in March 2021. The recent NPWS counts noted birds at Balloor, Doagh Island (30), Strath (340), Glassagh (105) and Doon Bridge (790). All of these sites were again remote from aquaculture activity, access routes.

Historically large flocks (ca. 2007 – 2010), were recorded from Strath (57-204 & 900-1700); Magheranaul (204-900); eastern tip of Glassagh Point (204-900) and Moanrealtagh 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 (NPWS *pers comm*) (see Figure 6.4).

One of the areas previously highlighted (NPWS, *pers comm*) were coastal fields south and west of Malin (see Figure 6.2-6.3). This is located just to the east of the main line of trestles; a significant proportion of which are currently licenced. Eastward extension comprises sites Under Appeal and new Applications. Access to the northerly trestle blocks would be from the R242 Lagg Road approximately 1km further to the west of the favoured fields. This area also hosts a works area with sheds etc. (see Plate 5.10). Recent counts did not record birds from this area. It is not clear whether birds are being actively displaced by activity on the shore adjoining favoured fields or whether it is merely an artefact of a small number of recent counts. The favoured fields experience disturbance from road traffic, but are isolated from houses, farmyards etc. Barnacle geese can habituate to consistent patterns of activity. Thus, while appropriate screening of this access, which is located on the edge of an existing cluster of houses, at a distance from the preferred fields, is unlikely to affect continued use of favoured fields close to Malin (refer to conditions / monitoring proposals below; see also Marchant, 2014); it cannot be completely discounted.

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 a proposed access point from the minor road leading to Glassagh Point to trestles mid-estuary (in subsite 0A439) (see Plate 5.4 & 5.5). While Barnacle Geese are known to occasionally roost intertidally in this area this is a rare occurrence. The large fields favoured by Barnacle Geese along the western side of Glassagh are, however, well screened from the access road to Glassagh Point by a combination of roadside hedges and areas of scrub and rough grassland not used by Barnacle Geese. Birds were recorded from southwest of Glassagh in 2021.

The other main block of trestles (also currently licenced) are located off Magheranaul; in this case the majority of licences are new applications, with a number of licence applications off Fegart Point, including one large Application north of Fegart Point. A number of access points are proposed from a minor road leading down to the shore at the western and eastern end of the trestles (see Figure 6.1). While this area is not highlighted as a key area, the 2007/08 and 2009/10 surveys did record birds 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.

While disturbance in these areas may not be significant; 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.

In summary, Barnacle Geese numbers are continuing to increase in Trawbreaga. Birds using Trawbreaga must, however, be considered together with birds from Malin as a single ecological unit. Interchange with Dunfanaghy should also be considered. 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.

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/c). 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*; 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, 2021).

Recommendations

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.

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 or indeed areas near Glassagh. In assessing any change in numbers, the numbers of birds at Trawbreaga Bay must be considered in the wider context of the population in Ireland and Scotland; a recent decision to allow an increase in shooting of Barnacle geese on Islay could conceivably result in movement of birds from Islay to sites in Ireland.

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, Glassagh Point and Malin access points (Figure 6.1). The ongoing cull in Scotland further increases the importance of such monitoring studies. The site visit in February 2021 also highlighted the issue with old oyster bags and trestles being located on the shore. Their removal needs to be addressed as they are preventing access to foraging areas by birds.

6.3.3. Light-bellied Brent Goose

6.3.3.1. Review of Light-bellied Brent Goose counts

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 48,000 in 2011/12, but with numbers falling as low as 32,000 birds. Over the period 2015 – 2017 the population has been between 35,000 and 40,000 birds (Lewis *et al.* 2018). In a number of recent years there has been total breeding failure (i.e. 2009, 2013 & 2017), while in other years the percentage of young exceeded 20% (i.e. 2004, 2007 & 2011) (Lewis *et al.* 2018).

Historically, between 70-240 Light-bellied brent geese used Trawbreaga Bay during the late 1960s and 1970s. This rose to 250 by the mid-1980s (from Robinson *et al.*, 2004; from Hutchinson, 1979; Shepard, 1993). Peak counts fell in the 1990s, followed by a period of increase; thereafter numbers were relatively stable at 300-400 in the 1990s. Robinson *et al.*, (2004) also noted that peak numbers occurred in January or February. Trawbreaga Bay is noted as being of importance for Light-bellied brent geese (Robinson *et al.*, 2004). Lough Swilly, which is located to the south also supports notable numbers of Light-bellied brent geese (peak count of 984 geese between 2011 – 2015).

The site population trend for Light-bellied Brent Goose at Trawbreaga Bay published in NPWS (2014b) 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 over that timeframe. As a result, the site conservation condition for Light-bellied Brent Goose at Trawbreaga Bay SPA at that time was assessed as favourable based on the increasing population (NPWS, 2014b/c).

During the NPWS waterbird survey programme 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 (i.e. 400; Lewis *et al.*, 2018). 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. A peak IWEBS count of 573 birds was recorded in 2012/13 (Lewis *et al.*, 2018).

Lewis *et al.* 2019 (Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10 – 2015/16) noted that numbers in Donegal “are now of national rather than international importance”; though it noted that “Trawbreaga Bay received low levels of survey coverage” and that “improved coverage in coming years might therefore reveal this site to be of similar importance to the previous period”.

Counts from the same period revealed no flocks of greater than 122 birds from Lagg Church Beach (K. Colhoun, *pers comm*). While these were not complete counts of the bay, they did highlight the possibility of a real decline in the numbers of Light-bellied brent geese at Trawbreaga Bay and were in line with feedback from NPWS (*pers comm*).

In the current study 151 Light-bellied brent geese were observed on 10th February 2021; 80 were recorded on the 12th February 2021. The location of flocks is shown on Figures 5.1 and 5.2. An IWEBS count undertaken by NPWS on the 12th February 2020 noted 128 Light bellied brent geese; while 182 were counted on the 28th November 2019. This more recent data suggests a large recent decline in numbers of Light-bellied brent geese at Trawbreaga.

Light-bellied Brent Goose is categorised as amber listed on the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021). 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.

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

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, 2014b). 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, 2014i). There will be no impact on *Zostera* beds within the bay.

6.3.3.2. Distribution of Light-bellied Brent Goose in Trawbreaga Bay

Historical Data

Light-bellied Brent Geese were recorded in all but one subsite (0A441 – Malin) during the NPWS waterbird survey programmes. Intertidal foraging was recorded within five subsites overall: 0A438, 0A439, 0A440, 0A442 and 0A443 (NPWS, 2014b). 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). There is a proposal for only a single licence (T12/511A) within 0A443. Within 0A443 Light-bellied brent geese are recorded along the northern shoreline east of the Back Strand as well as in small numbers just north of Doaghmore Point (see Figure 6.4).

The other two subsites where Brent Geese were consistently recorded in good numbers across the low tide counts (2009/2010) were 0A439 (Trawbreaga South) and 0A442 (North central). These two subsites also held high peak and mean numbers of Brent Geese. Counts are presented in Table 6.6, as is the percentage of birds (total count) occupying that subsite in a given count.

Table 6.6 Peak and mean counts and percentage occupancy of subsites where Brent Geese were recorded during low tide surveys for the NPWS waterbird survey programme.

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

Flock positions recorded the NPWS waterbird survey programme (2009/2010) showed 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).

The patterns of flock distribution from the NPWS waterbird survey programme were supported by additional information from site usage mapping collated 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 west of Doaghmore Point; inside the mouth of the bay, around the estuary of Ballyboe River at Malin (usage of these habitats were not recorded by NPWS waterbird survey programme flock maps) and broadly on the intertidal sand and mud flats northwest of Glassagh Point.

The pattern of distribution of geese from 2007/2008 and 2009/2010 are shown on Figure 6.5.

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.

In earlier versions of this Appropriate Assessment Report a number of figures were included which summarised the distribution of geese in Trawbreaga Bay based upon the above information. However, these data are now over 10 years old.

Consultation was also undertaken with NPWS in order to draw on local experience of Light-bellied brent geese numbers and spatial distribution. This again show the areas on both sides of the tidal channel inside the mouth of the bay running southeast towards Malin to be important, as is the foreshore near Glassagh Point.

It is not known to what degree the numbers and spatial distribution Light-bellied brent geese may have been influenced by existing trestles on site at that time.

6.3.3.3. Recent Distribution Data

Figure 5.1 and Figure 5.2 illustrate the areas Light bellied brent geese were recorded in during the Atkins site surveys in 2021. On the 10th February 2021 the majority of geese were located within 0A442, with some also within the southern part of 0A443; i.e. at Lagg Church Beach / Doagh Island. 21 birds were located within 0A439 – on the southern side of Doagh Island. These are areas within which trestles are located. 37 geese were recorded on the western side of Glassagh Point.

On the 12th February 2021 69 geese were again located within 0A442, with some also within the southern part of 0A443; i.e. at Lagg Church Beach / Doagh Island. 2 birds were located within 0A439 – on the southern side of Doagh Island. These are areas within which trestles are located. 3 geese were recorded on the western side of Glassagh Point.

In counts provided by K. Colhoun (*pers comm*) Lagg Church Beach supported counts of between 12 and 122 birds; with frequent flocks of >50 birds. This now appears to be the primary site for Light bellied brent geese, with small numbers off the south Coast of Doagh Island (part of 0A439) and around Glassagh Point (within 0A439).

A summary figure has been prepared which shows areas within which Light bellied brent geese were recorded (2007/08 – 2009/10) and well as areas frequented in more recent counts (Figure 6.5).

6.3.3.4. Response of Light-bellied Brent Goose to oyster trestles

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.

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.

More recently Inis Environmental undertook a study of Light-bellied brent geese in Carlingford Lough for the Marine Institute (Inis, 2020). Broadly speaking they found that *“The bird species using the areas are well habituated to aquaculture activity and generally undisturbed by it”*. They also found that *“They forage and roost amongst and on top of the oyster cultivation structures (trestles and bags) on almost all tides (particularly Light-bellied Brent Goose geese who exploit the fact that green algae grown on the oysters)”*. The latter is in line with other observations, which found that geese do often exploit green algae on trestles; often feeding on it as the tide fills in over the trestles. This is normally in the early season before water temperature drops and growth of green algae drops off. Inis (2020) did, however, find that *“Bird numbers show a slight decline in relation to previous studies, however the methodology is not directly comparable”*. The relationship between Light-bellied brent geese and trestles thus would appear to be quite site specific and whilst trestles can offer a feeding resource, the overall response of geese will be informed by location and scale of trestles relative to favoured habitat; the timing and level of algal growth which will be informed by the frequency of site maintenance; levels of on-site activity etc.

6.3.3.5. Impact Assessment – Light-bellied Brent Goose

The recent peak count of 151 Light-bellied brent geese recorded by Atkins in February 2021 and IWEBS of 182 birds in November 2019 represents a significant decrease in numbers of Light-bellied brent geese at Trawbreaga Bay (this is summarised in Table 6.7). this would at a minimum equate to an Unfavourable population status (i.e. where a population has declined between 25.0 – 49.9% from the baseline reference value).

Table 6.7 Trend in Light-bellied brent geese counts.

Count	Number
Baseline Period (Mean peak 1995/96 – 1999/00)*	362 (i)
Recent Mean (2-yr mean 2007/08 – 2008/09) (IWEBS)	366 (n)
Mean Peak (2006/07 – 2008/09) (IWEBS)	433 (i)
Peak IWEBS count 2012/2013	573
Peak recent IWEBS count (November 2019)	182
Atkins, 2021 (peak count)	151

*after Robinson et al. (2004) (i) denotes numbers of international importance (using Wetlands International, 2006 for baseline period and Wetlands International, 2012 for recent time period); (n) denotes numbers of all-Ireland importance (after Crowe & Holt, 2013).

While it is noted that Light-bellied brent geese do feed in grassland areas, which are not well covered by IWEBS counts, this does seem to suggest a real decline in numbers of Light-bellied brent geese at Trawbreaga. Furthermore, it is consistent with the overall impression of Light-bellied brent geese numbers by NPWS locally (NPWS *pers comm*). Furthermore, it is our understanding that numbers of birds have increased in the neighbouring site of Lough Swilly SPA. It is not clear therefore if Light-bellied brent geese have moved away from the shore to feed on grassland or if they have been displaced from the bay by the current pattern of activities.

Recent IWEBS data indicate a 20 year positive trend of +47.50; following by a slight recent decline – 10 year decline of -16.97 (Source: Online BWI Species trends). The site specific decline at Trawbreaga, however, is in excess of this decline.

Wigeon (*Anas penelope*), which shares many of the behavioural characteristics of brent geese¹¹, also appear to be declining on site. The baseline population referenced in the Natura form for the SPA was 214 (5-year peak count for 1995/96 – 1999/00). Peak numbers recorded in the 2009/2010 low tide surveys was 338. While IWEBS data records 245 Wigeon in the winter of 2010/11 numbers thereafter have been lower with a peak of 92 birds in 2017/18; 204 in 2018/19 and 107 birds in 2019/20.

Only new licence applications are considered as part of this impact assessment. All existing licences and licences under appeal are assumed to be operational and to form part of the existing environment and existing activities in the SPA. There is significant ongoing aquaculture industry within the bay (see Figure 6.1). Trestles are already located or are to be located in 0A439 and 0A442. There are no proposals for trestles within 0A438, 0A440, 0A441 or 0A443.

With respect to spatial distribution of birds, the Atkins counts from February 2021 show that geese are located within 0A442 and the bordering southern part of 0A443; as well as in 0A439. Within 0A439 they have are recorded on the southern shore of Doagh Island and at Glassagh. For IWEBS subsite boundaries refer to Figure 2.2. For flock location see Figure 6.5.

Table 6.8 Numbers and spatial distribution of Light-bellied brent geese in February 2021.

Subsite	0A439	Sectors	%	0A442	%	0A443	%	Total
10/02/2021				93	61.59%	58	38.41%	151
12/02/2021	3	Glassagh	3.45%	33	37.93%	36	41.38%	87
	15	Doagh Island	17.24%					

As noted, a number of IWEBS counts from November 2019 and February 2021 included counts of brent geese, which were distributed as follows (see Table 6.9).

Table 6.9 Numbers and spatial distribution of Light-bellied brent geese in recent IWEBS counts.

Subsite	0A438	%	0A439	%	0A440	%	0A442	%	0A443	%	Total
28/11/19	43	23.6					10	5.5	129	70.9	182
12/02/21	16	12.5	1	0.8	55	43.0	33	25.7	23	18.0	128

Many of the areas which historically supported Light-bellied brent geese did not record notable numbers of birds in recent counts. Table 6.6 summarises the distribution of geese in the 2009/2010 waterbird survey programme undertaken by NPWS. For example, the low tide peak in 0A439 (of 158 birds) exceeds the total counts for the number of Light-bellied brent geese in Trawbreaga bay as a whole. Refer to Figure 6.5 for a summary of spatial distribution of birds.

These would suggest that there may be some reduction in the areas favoured by Light-bellied brent geese, with large numbers in particular found in the Lagg Beach / Doagh Island area of the bay. This would be within 0A442 and the neighbouring section of 0A443; as well as in the western section of 0A439.

As noted, it appears that Light bellied brent geese do show some degree of tolerance to oyster farming using trestles; and that they can forage on green algae growing on the trestles. However, the latter can be viewed as a gain only in areas where the physical presence of the trestles does not exclude geese from traditional foraging sites. Furthermore, it must be considered that the Licenced trestles are already in place and thus counts from February 2021 are with these trestles already in place.

As explained in the methodology the potential for displacement of birds can be considered by examining the loss of habitat following the placement of trestles. Table 6.10 summarises such losses for sector 0A442 and 0A439 for new licence applications. As noted, no trestles are to be placed in 0A443. This is based on counts presented in Table 6.6 (2009/2010 low tide counts) and the percentage of birds on a given count with either

¹¹ Feeding on *Zostera*, green algae and grassland (Mathers & Montgomery, 1998; 2000).

0A439 or 0A442. As can be seen the proportion of birds within the large central subsite, 0A439, that are displaced is negligible.

In contrast, based on the methods outlined above, the level of displacement from licencing more plots in 0A442 would be a potential displacement of up to 4.78% of birds counted within Trawbreaga Bay SPA (again based 2009/2010 low tide counts as set out in Table 6.6). As noted, this is on top of patterns of displacement arising from existing trestles (see Section 7.2). The low tide data from 2009/2010 give the most complete set of spatial data with which to calculate potential displacement figures. This is on top of significant declines already evidenced from recent counts. Taken together this represents a displacement of up to 5.36% of the geese using Trawbreaga Bay SPA and represents a significant negative impact on the conservation status of Light-bellied brent geese using Trawbreaga Bay SPA.

Table 6.10 Potential for displacement of Light-bellied brent geese.

Subsite	0A442	% of Intertidal habitat	% Displacement of Brent geese	0A439	% of Intertidal habitat	% Displacement of Brent geese
Intertidal habitat						
Total Area (hectares)	151.37			395.42		
Applications Area	10.8	7.13%	4.78%	2.31	0.58%	0.48%

Recommendations

As noted, significant displacement levels (i.e., 5% or greater) occur where the current long-term population decline is already equal to or greater than 25%, as is the case for Light-bellied brent geese at Trawbreaga. The proposed applications could result in just under 5% displacement in a declining population. We understand that NPWS monitor geese annually at Trawbreaga Bay; we would recommend that NPWS be consulted to ensure that any such counts focus in particular on examining the numbers and spatial distribution of Light-bellied brent geese.

We would also recommend that a full count of the bay be undertaken with a view to collecting up to date information on numbers and spatial distribution. Without a clear understanding of the spatial distribution of Light-bellied brent geese and the use of terrestrial foraging grounds within the bay and environs, it cannot be stated whether the reduced number of observed birds can be explained by birds moving to feed terrestrially or whether birds have vacated the site. It therefore cannot be stated with confidence that displaced geese can be accommodated on grassland within Trawbreaga Bay and environs.

With respect to mitigation measures, an option to be considered would be the management of areas of grassland specifically for Light-bellied brent geese. This has recently been done in Baldoyle Bay, Dublin by Fingal County Council and should be explored further with National Parks and Wildlife Service. As noted, NPWS have recently entered in a number of farm plans with local landowners.

Consideration should be given to development of a Code of Practice covering aquaculture activities within the estuary; close liaison with NPWS regarding patterns of use of Trawbreaga by both Light-bellied Brent Geese and Barnacle Geese would be a key part of this process. For example, it should be a condition of planning that no dogs are allowed when accessing the foreshore to avoid disturbing geese; 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.

6.4. Wetlands

The Conservation Objectives define the favourable conservation condition of the wetlands QI in the Trawbreaga Bay SPA purely in terms of habitat area. 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 QI and it has been screened out from any further assessment.

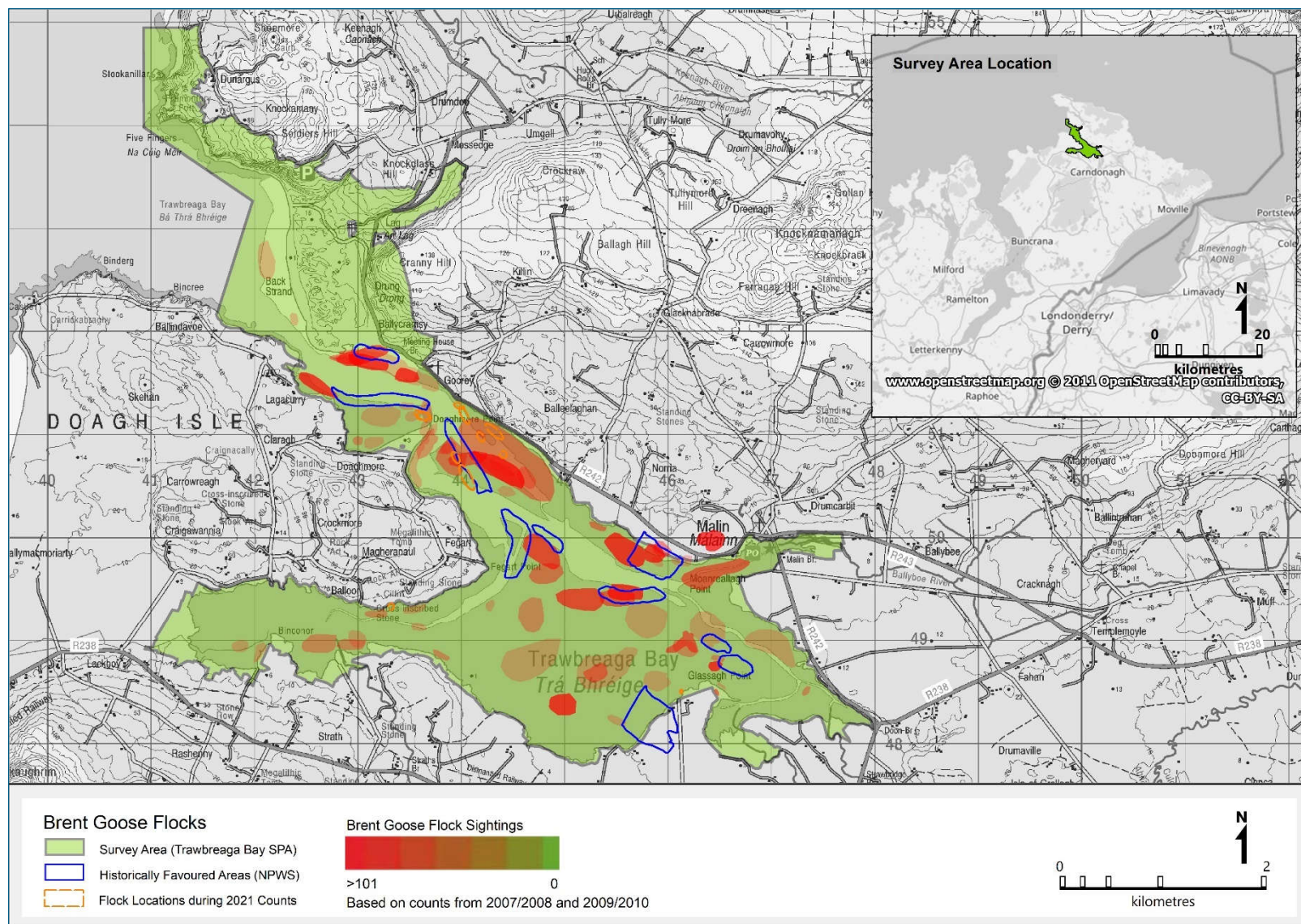


Figure 6.5 Summary of patterns of Light-bellied brent geese distribution.

7. In-combination effects of aquaculture with other activities

7.1. Introduction

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

7.2. Aquaculture Activities

As noted, there are already operation oyster trestles operating in Trawbreaga Bay (see Figure 6.1). There are 61 existing licences covering an area of 46.55ha; as well as a further 19 plots which are either licences recently approved / or are under appeal. The latter cover an area of 14.59ha. All plots are for extensive cultivation oysters using bags and trestles and are considered active (see Figure 6.1).

As with the current applications all current licences are within IWEBS subsites 0A439 and 0A442. The relative areas with intertidal and subtidal habitat occupied by trestles in subsites 0A439 and 0A442 is summarised in Table 7.1.

Table 7.1 Total area of existing aquaculture and applications in intertidal and subtidal habitat for IWEBS subsites 0A439 and 0A442.

Category	Intertidal (hectares)	Subtidal (hectares)
Total Area in SPA	827	314
0A439		
Total Area	395.42	27.57
Licensed	17.11	5.12
Applications	2.31	0.77
In-combination total	19.42	5.89
%	4.91%	n.a.
0A442		
Total Area	151.37	87.83
Licensed	11.14	23.46
Applications	10.80	2.11
In-combination total	21.94	25.57
%	14.5%	n.a.

As noted in the methodology, the potential for displacement of birds is calculated based on the area of available intertidal habitat (as a percentage); the proportion of birds (expressed as a percentage of those counted in the SPA and the area that would be lost to the placement of trestles. Both areas are characterised by intertidal, shallow subtidal and subtidal habitats. However, as noted in the case of Light-bellied brent geese, they are capable of reaching approximately 40 cm below surface when upending and therefore can make use of shallow subtidal waters as the tide is changing (Clausen, 2000); as well as grazing on terrestrial grassland. As accurate bathymetric data are not available, the following figures focus on displacement from intertidal areas; displacement from a small area of shallow subtidal would result in a further small increase in displacement figures.

Table 7.2 summarised In-Combination levels of displacement that would arise from the proposed Applications in addition to current patterns of activity.

Table 7.2 In-combination potential for displacement of Light-bellied brent geese.

Subsite	OA442	% of Intertidal habitat	% Displacement of Brent geese	OA439	% of Intertidal habitat	% Displacement of Brent geese
Intertidal habitat						
Total Area (hectares)	151.37			395.42		
Applications Area	10.8	7.13%	4.78%	2.31	0.58%	0.48%
Licensed	11.135	7.34%	4.92%	17.11	4.33%	3.59%
Total	21.935	14.49%	9.7%	19.42	4.91%	4.08%

Taken together this represents a potential total displacement of up to 13.78% of the geese using Trawbreaga Bay SPA and represents a significant negative impact on the conservation status of Light-bellied brent geese using Trawbreaga Bay SPA.

As noted, significant displacement levels (i.e., 5% or greater) occur where the current long-term population decline is already equal to or greater than 25%, as is the case for Light-bellied brent geese at Trawbreaga. The proposed applications could result in up to 13.78% displacement in a declining population. We understand that NPWS monitor geese annually at Trawbreaga Bay; we would recommend that NPWS be consulted to ensure that any such counts focus in particular on examining the numbers and spatial distribution of Light-bellied brent geese.

7.3. Activities

7.3.1. Disturbance generating activities

Five different activities were recorded to cause disturbance to waterbirds during the NPWS waterbird survey programmes in 2009/2010. These were walking (including with dogs), motorised vehicles, bait-digging, hand-gathering of molluscs and activities associated with intertidal aquaculture (NPWS, 2014c). 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).

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, 2014c).

Disturbance events were most frequently recorded in subsite OA442 (north central) associated with aquaculture activities, both machinery and workers walking on the intertidal zone and in subsite OA443 (back strand) and were mainly associated with recreation activities such as walkers along the shoreline and dogs.

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 counter's vehicle and a flock of sheep entering a field in which the geese were present.

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	-	-

7.3.2. Proposed Aquaculture Sheds (Planning Ref. 14/50918)

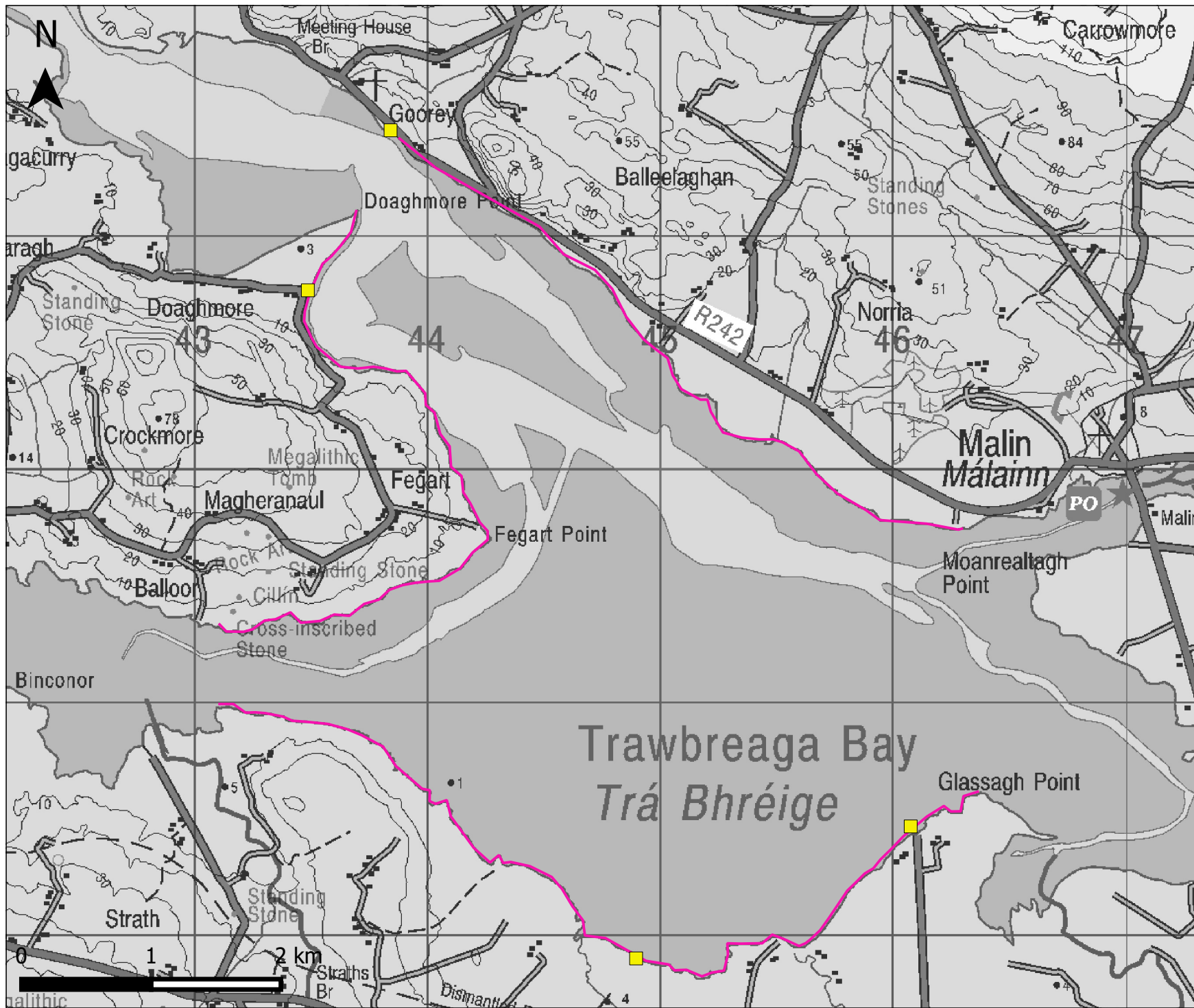
When initially assessed, a planning application had been lodged with Donegal County Council for “*The proposed development will involve the construction of four self-contained shellfish handling / sorting facilities on a single site, each of which will contain corrugated metal sheds and external working, 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.*”

The Donegal County Council Planning portal indicates that application 14/50918 has been withdrawn (last accessed 14th December 2017).

7.3.3. Seaweed Harvesting

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). No decision has as yet been made on this application.

If seaweed harvesting is to be licenced, we would recommend the development of a working Code of Practice (see e.g. Ecofact, 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 Geese would be a key part of this process. Consideration would also need to be given to the potential for disturbance of field feeding Barnacle Geese, either whilst on the shore or when accessing works areas. In a similar application (Ecofact, 2014) restrictions on timing of works in ecologically sensitive areas were agreed with NPWS.



Legend

- Seaweed Harvesting Access Points
- Proposed Seaweed Harvesting Areas

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: PO'D	Authorised: PO'D
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Date: 30/03/21	Date: 30/03/21	Date: 30/03/21
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Drawing No: Figure 7.1	Rev: 0
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ATKINS Dublin - Tel: 353 - 1 - 810 8000
Cork - Tel: 353 - 21 - 429 0300
Galway - Tel: 353 - 91 786050

7.3.4. Residential / Recreational Developments

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

7.3.5. Activities affecting waterbird food resources

7.3.5.1. Bait digging and shellfish collecting

None of the Qualifying 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 QI species. However, the presence of bait diggers and shellfish collectors along the shoreline and in the intertidal area may have an effect on QI species through disturbance.

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 WSP 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.

7.3.5.2. Water Quality

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

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 (2014b) report the status of the Ballyboe River as ‘good;’ the Glennagannon River as ‘moderate’ and the Donagh River ‘good-poor’.

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, 2014b). 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.

Carndonagh-Malin waste water treatment plant is located close to the shore just east of Glassagh Point (Discharge Licence no. - D0113-01). It has an operational capacity of 5833 PE (i.e. in the plant category of 2,001 to 10,000 PE). It is a plant focusing on the treatment of urban waste water. Treatment type is secondary treatment. Primary treatment is via Mechanical screening and grit removal; while secondary treatment is via Conventional Activated Sludge. Sludge arising from the plant is taken to the Letterkenny Sludge Hub. Discharge is to Ballywilly Brook just upstream of its discharge to Trawbreaga Bay. The 2018 Annual Environmental Report (EPA, 2018) for the Carndonagh Malin plant indicates that capacity will not be exceeded with 3 years. The AER (EPA, 2018) does indicate that sewage does reach the bay via Storm Water Overflows (SWO).

Ballyliffin waste water treatment plant is located north of the village (Discharge Licence no. - D0351-01). It has an operational capacity of 400 PE. It is a plant focusing on the treatment of urban waste water. Treatment type is secondary treatment. Discharge is to a small stream which discharges to the sea at Pollan Bay, west of Doagh Island and outside of Trawbreaga Bay. The 2019 Annual Environmental Report (EPA, 2019) for the Ballyliffin plant indicates that capacity will be exceeded with 3 years. There is no treatment plant at Malin on the northern side of the bay.

8. Conclusion and Recommendations'

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.

As noted, a National Survey of Chough is proposed for 2021.

Barnacle Geese

The site conservation condition of Barnacle Goose at Trawbreaga Bay SPA has 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 small scale 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. While the risk of negative impacts cannot be entirely discounted, geese are likely to habituate to repeated patterns of work at trestles on the intertidal close to foraging fields. 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 may arise in the future. Furthermore, it is our understanding that NPWS intend to use data from an ongoing programme of darvic colour ringing to examine local site use and movements. Once available this should also be reviewed against ongoing patterns of aquaculture activity.

It should also be a condition of planning that no dogs are allowed when accessing the foreshore to avoid disturbing geese; 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; and that unused equipment (e.g. trestles; bags etc.) are removed from the foreshore.

Light-bellied brent geese

When compared to historic site counts, recent counts undertaken in 2019 and 2021 suggests a large recent decline in numbers of Light-bellied brent goose at Trawbreaga. Thus, the conservation condition of Light-bellied brent geese has been assessed as Unfavourable In Trawbreaga Bay SPA. The decline in Trawbreaga would appear to be higher than the current national trend which is a -15.5% (5 year; 2012 census); -10.2% (10 year; 2007 census) and +96 % (20 year; 1997 census). Unlike Barnacle geese, Light-bellied brent goose feed both on the foreshore and in areas of improved grassland. It is not clear whether birds i) preferentially moved to feed on grassland; ii) being displaced from the foreshore and forced to feed on grassland or iii) being displaced entirely from Trawbreaga Bay SPA to another site, such as Lough Swilly. While there is evidence of field feeding numbers involved is unknown. There is anecdotal evidence that numbers of Light-bellied brent geese at Lough Swilly have increased.

As noted, 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. No decision has as yet been made on this application. In a similar application in Clew Bay (Ecofact, 2014) restrictions on timing of works in ecologically sensitive areas which were included in a Code of Practice. With respect to in-combination impacts, the 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 Seaweed Harvesting NIS (Aquafact, 2013) to comment on the proposed timing, level and spatial distribution of activity associated with proposed seaweed harvesting. While the potential for management of *Ascophyllum* to 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 cannot be discounted, the risk of increased patterns of disturbance could result in significant negative impacts (see comments on proposed Code of Practice / monitoring recommendations).

A clear Code of Practice; close consultation with NPWS and continuation of annual monitoring of Light-bellied Brent Geese is recommended. It is important to more fully understand the use of sites and different habitats, including grassland, by Light-bellied brent geese in order to properly understand the apparent decline in numbers. As with the Barnacle geese, darvic rings have also been placed on Light-bellied brent geese. The scheme co-ordinators should be consulted for any records of birds moving from Trawbreaga to alternate sites. It may also be necessary to do some targeted searches for birds on key neighbouring sites such as Lough Swilly.

The findings of this study would inform whether areas of grassland could be managed specifically to support Light-bellied brent geese, as has recently been done by Fingal County Council. This should be done in co-operation with Farm Plans recently agreed by NPWS with a number of local landowners.

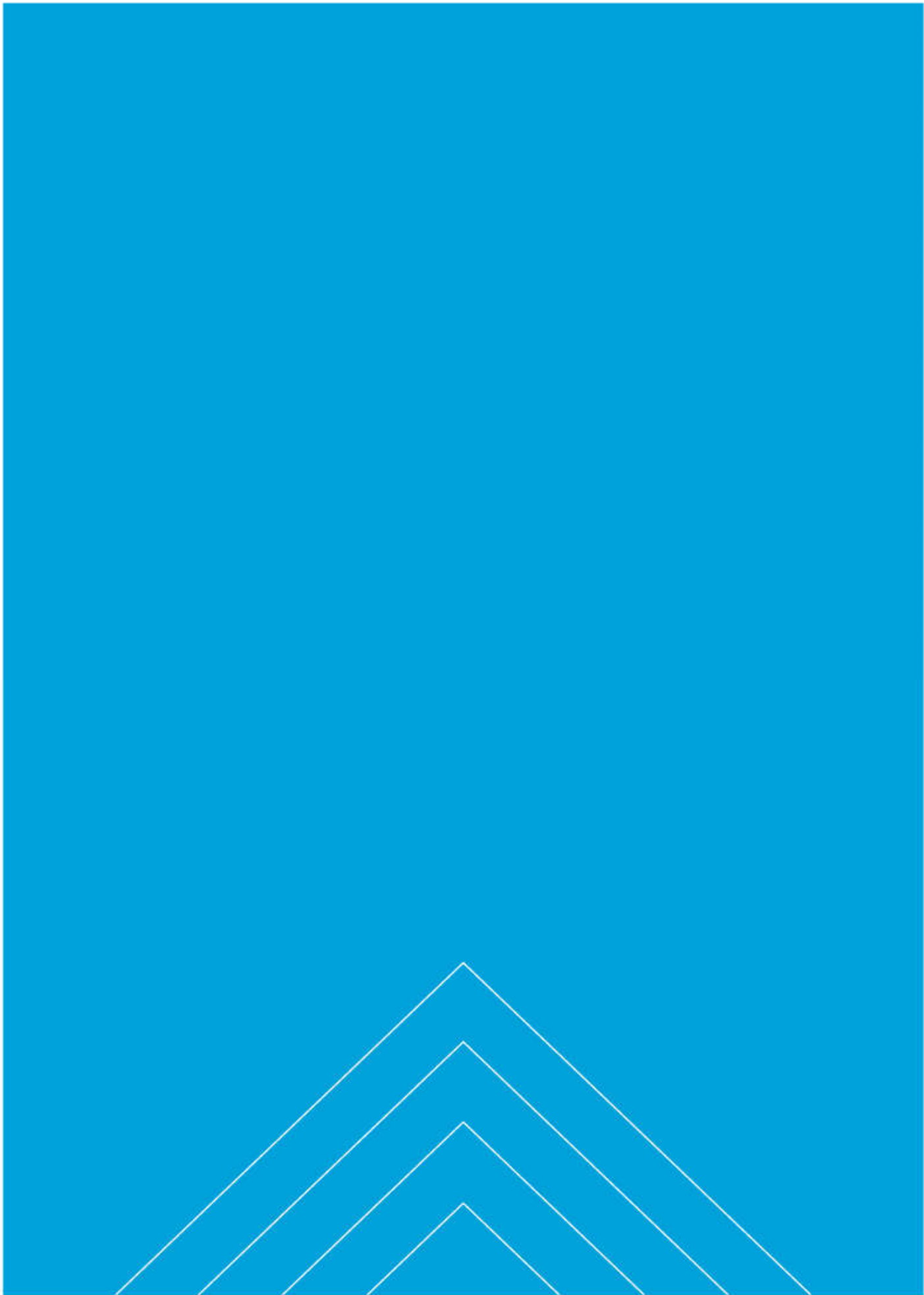
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WS Atkins Ireland Limited
Unit 2B
2200 Cork Airport Business Park
Cork
T12 R279

Tel: +353 21 429 0300

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