

An Bord Achomharc Um Cheadúnais Dobharshaothraithe
Aquaculture Licences Appeals Board



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assessing potential impact on

Wild Birds

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Aquaculture Licences Appeals Board

Appeal Ref No. AP2/2015

Bird Expert's Report: Briefing Note

Bird impact assessment

5 February, 2018

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Table of Contents

Introduction	3
Brief.....	3
Methodology and data sources	4
SPA review.....	6
Introduction	6
SPAs.....	6
Preliminary screening.....	6
Distribution and status of the SCI populations	7
Beara Peninsula SPA.....	7
Bull and the Cow Rocks SPA	7
Mobility of the marine SCIs.....	8
Beara Peninsula SPA.....	8
Bull and the Cow Rocks SPA	8
Other SPAs.....	9
Potential impacts	10
Introduction	10
Potential impacts on habitat quality and food resources.....	11
Potential disturbance impacts	11
Avoidance of structures	11

Avoidance of human activity.....	12
Potential impact of entanglement with nets.....	13
Lighting.....	13
Other potential impacts.....	13
Vulnerability of the species of interest.....	14
Introduction.....	14
Fulmar (Beara Peninsula SPA).....	14
Distribution and habitat preferences.....	14
Sensitivity.....	15
Assessment.....	15
Storm Petrel (Bull and the Cow Rocks SPA).....	16
Distribution and habitat preferences.....	16
Sensitivity.....	16
Sensitivity.....	17
Gannet (Bull and the Cow Rocks SPA).....	17
Distribution and habitat preferences.....	17
Sensitivity.....	18
Assessment.....	18
Puffin (Bull and the Cow Rocks SPA).....	19
Distribution and habitat preferences.....	19
Sensitivity.....	19
Assessment.....	19
Lesser Black-backed Gull (Deenish Islands SPA and Puffin Island SPA).....	20
Distribution and habitat preferences.....	20
Sensitivity.....	20
Assessment.....	21
Cumulative impacts.....	21
Introduction.....	21
Aquaculture activity in Bantry Bay.....	22
Interactions with the species of interest.....	23
Fulmar (Beara Peninsula SPA).....	23
Gannet (Bull and the Cow Rocks SPA).....	23
Cumulative impacts.....	24
Fulmar (Beara Peninsula SPA).....	24
Gannet (Bull and the Cow Rocks SPA).....	24
Evaluation of the existing EIS and EIA.....	25
Introduction.....	25
Evaluation of the EIS.....	25

Content.....25
Evaluation.....26
Evaluation of the EIA.....27
 Content.....27
 Evaluation.....27
AA requirements27
References.....28

Introduction

An application for a salmon farm at Shot Head, Bantry Bay, Co. Cork has been submitted and approved by the Minister for Agriculture, Food and the Marine. Subsequently, a number of appeals were lodged under the provisions of Section 40(1) of the Fisheries (Amendment) Act 1997. The Appellants raised a wide range of issues as grounds for their appeal, and an Oral Hearing was convened by the Aquaculture Licence Appeals Board. The Oral Hearing considered the technical complexity of the issues raised by key stakeholders in respect of specific concerns relating to risks to species of conservation significance in Bantry Bay.

Subsequent to the Oral Hearing, the following recommendations were presented in the Oral Hearing Chair's Report:

Before making a determination pursuant to section 40(4) of the Fisheries (Amendment) Act 1997, the Board should conduct desk-top studies of the following matters, which may indicate the need for supplemental appropriate assessment (AA) screening for such matters:

- *The potential impacts upon common seal populations in the Glengarriff Harbour and Woodland SAC; and*
- ***The potential impacts upon wild birds within nearby SPAs.***

The purpose of the present report is to address the second point (emboldened above).

Brief

The brief for this report was as follows:

The expert will undertake a desktop review of the potential for adverse impact(s) from the proposed fish farm on the adjacent SPAs and their respective bird qualifying interests and provide expert advice on possible requirement for an Appropriate Assessment under the terms of the Habitats Directive. This should include:

- *A review of the designated SPAs adjacent to, or within close proximity to, Shot Head, with due regard for bird mobility in respect of the distance to the proposed fish farm site;*
- *An assessment of the vulnerability of the species of interest, for which each identified site is designated, to salmon aquaculture activity at Shot Head;*
- *An evaluation of the potential cumulative or combined impacts of the wider aquaculture activity in Bantry Bay, with an assessment of the contribution to direct and indirect adverse impacts (if any) that the additional Shot Head fish farm is likely to make on the bird resource.*
- *An evaluation of the existing EIS and EIA and in the context of the requirement (or not) of an Appropriate Assessment consistent with Article 6(3) and 6(4) of the Habitats Directive (92/43/EEC), providing an opinion on whether further or supplementary screening is appropriate.*

This document is structured to address the specific requirements of this brief.

Methodology and data sources

The assessment contained in this briefing note is based on a desk review of relevant information.

For the purposes of this assessment, Bantry Bay has been defined as the marine area to the west of a line drawn from Pulleen Harbour to Sheep's Head (Figure 1).

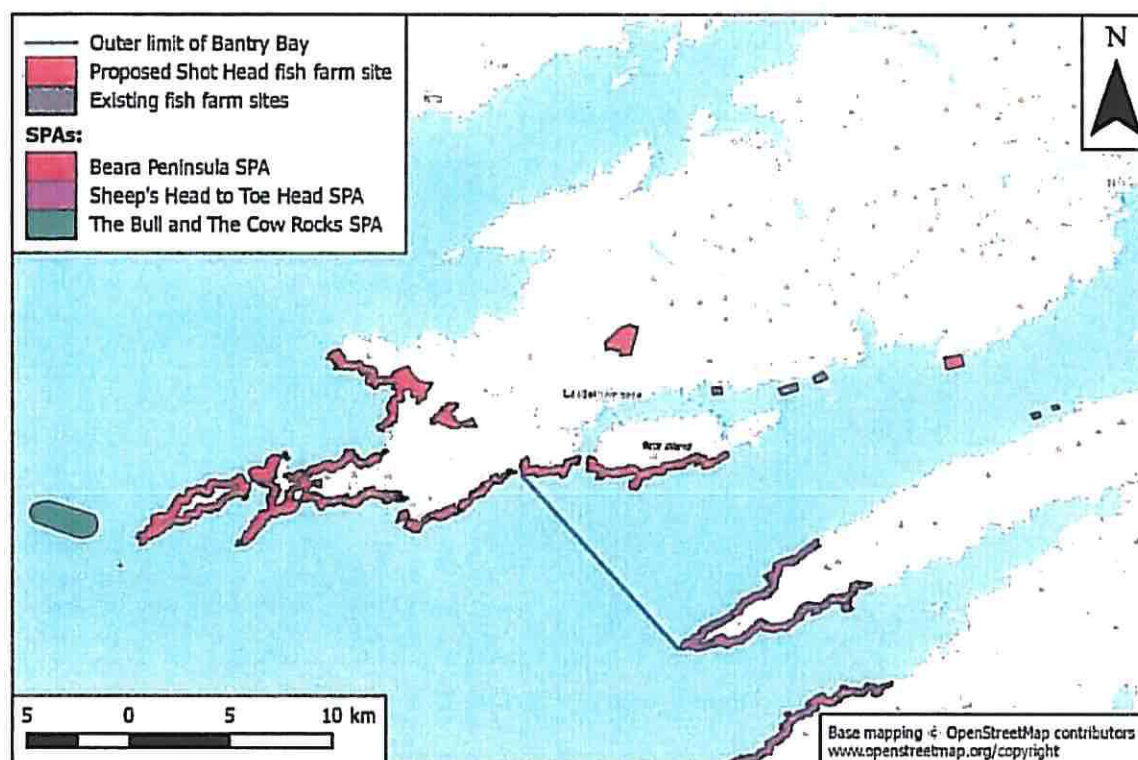


Figure 1. SPAs adjacent to, or within close proximity to, Shot Head.

In addition to the documentation associated with the licence application, a key source used was the *Risk Assessment for Marine Mammal and Seabird Populations in Southwestern Irish Waters (R.A.M.S.S.I.)* (Roycroft et al., 2007). This report describes the results of seabird surveys carried out in Bantry Bay between 2001 and 2004. These included marine transect surveys and shore-based vantage point watches. The marine transect surveys were carried out monthly, or bi-monthly, between July 2001 and September 2002, and between June and September 2003, and covered an 80 km route along both sides of the bay between Whiddy Island and Bear Island (Figure 2). The survey results were used to calculate bird densities within a 200 m wide strip along the transect route. The shore-based surveys were carried out from six vantage points within and around Bantry Bay (Figure 2). The surveys were carried out between June 2001 and February 2004 at two of the vantage points (Inner Bantry Bay and Sheep's Head) and between June 2003 and September 2004 at the other four sites. The results of the surveys were used to calculate densities within 2 km of the Inner Bantry Bay and Sheep's Head vantage point locations (a theodolite was used during these surveys at these locations which allowed accurate recording of bird positions).

While the above surveys were carried out around 15 years ago, the general patterns of seabird distribution within and around Bantry Bay are unlikely to have changed significantly. In particular, it should be noted that there were four fish farms present within Bantry Bay at the time of these surveys, so any influence of the presence of the fish farms on the overall numbers of seabirds occurring within Bantry Bay should already have been operating. However, the transect routes did

not pass close to any of the fish farm sites (assuming that they were in the same places as the current location), so the surveys do not indicate what influence, if any, the fish farms had on the detailed distribution patterns of seabirds within the bay.

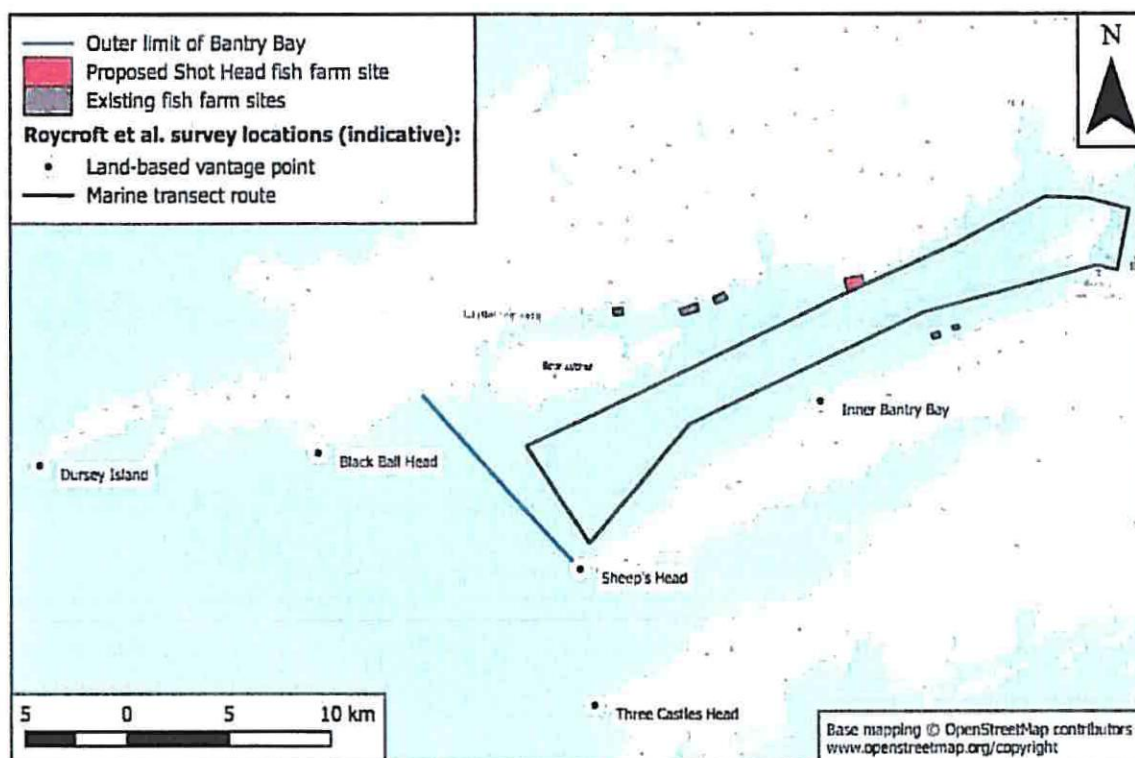


Figure 2. Marine transect route and land-based vantage points used in the Roycroft et al. (2007) seabird surveys of Bantry Bay.

Other data sources used include:

- Details of aquaculture licences in Bantry Bay contained in *Ireland's Marine Atlas* (<https://atlas.marine.ie>). This data was last updated on the 15th December 2017
- JNCC seabird colony dataset comprising a full dataset of all colonies surveyed since 1986 (last updated 22 October 2010; <http://jncc.defra.gov.uk/page-4460>). This includes the results of the Seabird 2000 survey, which is the most recent complete survey of seabird colonies in Britain and Ireland.¹
- A review of seabird foraging ranges carried out by Thaxter *et al.* (2012). This review assessed mean, mean maximum and maximum foraging ranges for most of the seabird species that breed in Ireland. These provide information on likely typical distances that seabirds will travel from their breeding colonies to forage. This review also contributed to the Seabird Wikispace, which was an online resource developed by BirdLife International, although this resource is no longer available. The explanatory document for the Seabird Wikispace (Lascelles, 2008) says "it may be useful to think of areas within the average foraging range as a core zone of activity being exploited by the majority of the birds the majority of the time, and those between the average and the maximum foraging range as a buffer zone, exploited by fewer birds for less of the time" (although it also acknowledges that this is not always the case). Therefore, the mean foraging range distance (rather than the mean maximum or

¹ These data were extracted from the Seabird Monitoring Programme Database [at www.jncc.gov.uk/smp and/or www.jncc.gov.uk/page-4460]. Data have been provided to the SMP by the generous contributions of nature conservation and research organisations, and of many volunteers throughout the British Isles.

maximum) will generally provide the best indication of the likely core foraging range distance.

SPA review

Introduction

This section addresses the following part of the brief:

A review of the designated SPAs adjacent to, or within close proximity to, Shot Head, with due regard for bird mobility in respect of the distance to the proposed fish farm site.

SPAs

There are three SPAs within the Bantry Bay area: the Beara Peninsula SPA; the Bull and the Cow Rocks SPA; the Sheep's Head to Toe Head SPA (Figure 1).

The Beara Peninsula SPA extends along the coastline of the outer part of the Beara Peninsula from Bear Island to just north of Allihies, coming to within 12 km of the proposed fish farm site at its closest point². The SPA also includes two inland areas. The Special Conservation Interests (SCIs) of this SPA are Fulmar and Chough.

The Bull and the Cow Rocks SPA includes two small islands about 3 km west of Dursey Island and a 500 m buffer zone of marine habitat around the islands. The SPA is around 45 km from the proposed fish farm site. The SCIs of this SPA are Storm Petrel, Gannet and Puffin.

The Sheep's Head to Toe Head SPA comprises three disjunct sections of coastline: around and to the west of Toe Head; around Mizen Head; and around Sheep's Head. The SPA is around 11 km from the proposed fish farm site at its closest point. The SCIs of this SPA are Peregrine and Chough.

Preliminary screening

Peregrine is a largely terrestrial species. Birds nesting on coastal cliffs may take seabirds over the water adjacent to the cliffs. However, when this happens, they generally keep to within a few 100 m of the coast. The Sheep's Head to Toe Head SPA is over 10 km from the proposed fish farm site, and on the opposite side of Bantry Bay. Therefore, the Peregrine SCI of the Sheep's Head to Toe Head SPA will not have any spatial overlap with the proposed fish farm site and can be screened out from further assessment.

Chough is a purely terrestrial species. Therefore, the Chough SCIs of the Beara Peninsula SPA and the Sheep's Head to Toe Head SPA will not have any spatial overlap with the proposed fish farm site and can be screened out from further assessment.

The other SCI species are birds of coastal and marine habitats and the proposed fish farm site is within the likely foraging ranges of the SCI populations. Therefore, further assessment is required for these species.

² All distances between SPAs and the proposed fish farm site in this briefing note are measured using the shortest distance for a bird travelling at sea.

Distribution and status of the SCI populations

Beara Peninsula SPA

Fulmar

The NPWS site synopsis for the Beara Peninsula SPA states that the SPA holds “a nationally important population of Fulmar (575 pairs)”. The figure quoted in the site synopsis appears to be based on the Seabird 2000 survey, which recorded a total of 575 apparently occupied sites (AOS) for Fulmar on Dursey Island. The Seabird 2000 survey did not record any nesting Fulmar anywhere else within the Beara Peninsula SPA. However, review of the dataset suggests that this is due to lack of survey effort, rather than absence of Fulmars. The Bird Atlas 2007-11 (Balmer *et al.*, 2013) recorded breeding Fulmar in hectads V54, V64, V74 and V84. Breeding Fulmar have also been recorded in eight tetrads along the northern side of Bantry Bay: V64R, V64V, V64W, V74A, V74B, V74G, V74R and V84P (Bird Atlas 2007-2011 dataset, held by the National Biodiversity Data Centre). Therefore, breeding Fulmar appear to be widely distributed throughout the Beara Peninsula SPA along the northern side of Bantry Bay.

There is no specific information available on the foraging areas used by the Fulmar SCI of the Beara Peninsula SPA.

There are no detailed conservation objectives for the Fulmar SCI of the Beara Peninsula SPA. However, the conservation objectives for the Fulmar SCI of the Saltee Islands SPA (NPWS, 2011) can be used as an indication of the type of detailed conservation objectives that would need to be considered in a Stage 2 Appropriate Assessment.

Bull and the Cow Rocks SPA

Storm Petrel

The NPWS site synopsis states that Storm Petrel breed on both the Bull and Cow Rocks and describes the population as being of national importance with an estimated population of 3,500 pairs in 2000. The JNCC seabird colony dataset does not include any data for this population.

There is no specific information available on the foraging areas used by the Storm Petrel SCI of the Bull and the Cow Rocks SPA.

There are no detailed conservation objectives for the Storm Petrel SCI of the Bull and the Cow Rocks SPA.

Gannet

The Gannet colony is located on the Bull Rock. The NPWS site synopsis describes this colony as being of national importance with an estimated population of 3,694 pairs in 2004. The JNCC seabird colony dataset provides population estimates of 1,815 apparently occupied nests (AON) in 1984, 1,511 AON in 1,985, 1,879 AON in 1,999 and 3,694 AON in 2004. The population was estimated as 6,388 AOS in 2014 (Newton *et al.*, 2015). Therefore, in line with other Irish colonies there has been a major increase in this Gannet population over the last 30 years.

Foraging movements of 14 Gannets from the Bull and the Cow Rocks SPA colony have been tracked as using GPS loggers, as part of a wider study into the interaction between Gannet foraging movements and fishing vessels (Bodey *et al.*, 2014). The specific data for the Bull and the Cow Rocks SPA colony has not been published separately. However, given the relatively small number of birds

tracked from this colony, the utility of this data in assessing the usage of Bantry Bay by Gannets from the Bull and the Cow Rocks SPA colony would be limited.

There are no detailed conservation objectives for the Gannet SCI of the Bull and the Cow Rocks SPA. However, the conservation objectives for the Gannet SCI of the Saltee Islands SPA (NPWS, 2011) can be used as an indication of the type of detailed conservation objectives that would need to be considered in a Stage 2 Appropriate Assessment.

Puffin

The NPWS site synopsis provides an estimate from the early 1990s of 200 pairs for the Puffin population of the Bull and the Cow Rocks SPA and states that it may be of national importance. Roycroft *et al.* (2007) provide an estimate of 258 pairs, based on a 1994 count from the Bull and a 1970 count from the Cow. The JNCC seabird colony dataset does not include any data for this population.

There is no specific information available on the foraging areas used by the Puffin SCI of the Bull and the Cow Rocks SPA.

There are no detailed conservation objectives for the Puffin SCI of the Bull and the Cow Rocks SPA. However, the conservation objectives for the Puffin SCI of the Saltee Islands SPA (NPWS, 2011) can be used as an indication of the type of detailed conservation objectives that would need to be considered in a Stage 2 Appropriate Assessment.

Mobility of the marine SCIs

Beara Peninsula SPA

Fulmar

Thaxter *et al.* (2012) gives a mean foraging range for Fulmar of 47.5 km, a mean maximum of 400 km and a maximum of 580 km, with a moderate degree of confidence in the assessment. The proposed fish farm site is around 12 km from the eastern end of the Beara Peninsula SPA. Therefore, the site is well within the likely core foraging range distance of the Fulmar SCI of the Beara Peninsula SPA.

Bull and the Cow Rocks SPA

Storm Petrel

Thaxter *et al.* (2012) gives a maximum foraging range of > 65 km, but does not give any information on mean foraging ranges. The proposed fish farm site is around 45 km from the Cow Rock. Therefore, in the absence of any more detailed information on Storm Petrel foraging ranges, the possibility that the site is within the likely core foraging range distance of the Storm Petrel SCI of the Bull and the Cow Rocks SPA cannot be ruled out.

Gannet

Thaxter *et al.* (2012) gives a mean foraging range of 92.5 km, a mean maximum of 229.4 km and a maximum of 590 km, with a high degree of confidence in the assessment. However, Gannet foraging ranges at individual colonies appear to be correlated with the size of the colony, due to intraspecific competition causing birds to range farther from larger colonies (Lewis *et al.*, 2001). This relationship has been used to predict a mean foraging range from the Bull and the Cow Rocks SPA colony of 60.9 km, and a maximum foraging range of 207.4 km (Grecian *et al.*, 2012). The proposed fish farm site is

around 47 km from the Bull Rock. Therefore, it is well within the likely core foraging range distance of the Gannet SCI of the Bull and the Cow Rocks SPA.

Puffin

Thaxter *et al.* (2012) gives a mean foraging range of 4 km, a mean maximum of 105.4 km and a maximum of 200 km, with a low degree of confidence in the assessment. However, as the mean foraging range figure is only based on a single study it is not really useful for the purposes of the present assessment. Data on Puffin foraging ranges from two reviews are summarised in Table 1. This indicates that, for most colonies, foraging ranges of more than 40 km are uncommon, but exceptions occur. However, some of the studies quoted, particularly by Cramp and Simmons (2004), may be based on rather limited data. The proposed fish farm site is around 45 km from the Cow Rock. Therefore, the possibility that the site is within the likely core foraging range distance of the Puffin SCI of the Bull and the Cow Rocks SPA cannot be ruled out.

Table 1. Summary of data on Puffin foraging ranges from two reviews.

Source	Location	Details
Cramp and Simmons (2004)*	Kerry	Similar range to Skomer
	Skomer	85% within 3 km, most within 8 km, maximum 37 km
	Barents Sea	close inshore, males may fly 15-25 km
	Unknown	mostly 2-10 km
Harris <i>et al.</i> (2012)**	St Kilda	mostly within 40 km
	Isle of May	long trips, including an overnight stay, 38–66 km; short daytime excursions, 9–17 km
	Farne Islands	majority of foraging within 20 km of the colony
	Skomer	85% within 15 km of the colony, 99% within 25 km, maximum 35 km
	Faeroe Islands	up to 250 km when feeding conditions are poor
	Norway	up to 137 km when feeding conditions are poor
	Newfoundland	usually 3–5 km from the colony, sometimes up to 70 km

*Cramp and Simmons (2004): from section on Food in Puffin species account.

**Harris *et al.* (2012): data for the Isle of May from the results reported in the paper; data for the other locations from the Discussion. Note that the data for the Isle of May and the Farne Islands are derived from GPS tracking.

Other SPAs

While the brief for this assessment refers specifically to SPAs adjacent to, or within close proximity to, Shot Head, for Appropriate Assessment purposes it is also necessary to consider more distant SPAs if there is potential for interaction with the proposed fish farm site.

The other SPAs with seabird SCIs in the wider vicinity of Bantry Bay are: Deenish Island SPA (around 60 km from the proposed fish farm site), the Iveragh Peninsula SPA (around 64 km from the proposed fish farm site), Puffin Island SPA (around 73 km from the proposed fish farm site) and the Skelligs SPA (around 74 km from the proposed fish farm site). The likely core foraging range distances of the seabird SCIs of these SPAs in relation to the distances of the SPAs from the proposed fish farm site are summarised in Table 2. The proposed fish farm site is outside the likely core foraging range distance of most of these SCIs. The site may be within the core foraging range

distance of the Storm Petrel SCIs of Deenish Island SPA, Puffin Island SPA and the Skelligs SPA, and of the Gannet SCI of the Skelligs SPA. However, both these species are already screened in for assessment. As it is not possible to distinguish the colony of origin of birds occurring in Bantry Bay, for the purpose of this assessment, it has been assumed that any Storm Petrels or Gannets occurring within Bantry Bay come from the nearest colony (the Bull and Cow Rocks SPA). The site may also be within the core foraging range distance of the Lesser Black-backed Gull SCI of Deenish Island SPA and Puffin Island SPA.

Table 2. Seabird SCIs of other SPAs in the wider vicinity of Bantry Bay.

SPA	Distance	SCI	Foraging range	Confidence
Deenish Island	61	Fulmar	47.5	moderate
		Manx Shearwater	18.3	moderate
		Storm Petrel	> 65	Note 1
		Lesser Black-backed Gull	71.9	moderate
		Arctic Tern	7.1	moderate
Iveragh Peninsula	64	Fulmar	47.5	moderate
		Kittiwake	24.8	high
		Guillemot	37.8	high
Puffin Island	73	Fulmar	47.5	moderate
		Manx Shearwater	18.3	moderate
		Storm Petrel	> 65	poor
		Lesser Black-backed Gull	71.9	moderate
		Razorbill	23.7	moderate
		Puffin	40	Note 2
Skelligs	74	Fulmar	47.5	moderate
		Manx Shearwater	18.3	moderate
		Storm Petrel	> 65	poor
		Gannet	99.3	Note 3
		Kittiwake	24.8	high
		Guillemot	37.8	high
		Puffin	40	Note 2

Foraging ranges are mean foraging ranges and these and the confidence levels are from Thaxter *et al.* (2012) unless otherwise stated below. Note 1: maximum foraging range. Note 2: qualitative estimate based on data in Table 1. Note 3: colony-specific predicted foraging range from Grecian *et al.* (2012).

Potential impacts

Introduction

This section does not address a specific part of the brief but provides a background review of the potential impacts of marine fish farms on seabird populations, which is then used to inform the assessment of the vulnerability of the species of interest in the next section.

Potential impacts on habitat quality and food resources

The proposed fish farm will involve the introduction of structures into an area of open marine water and this will cause changes to the habitat within the footprint of the farm, and is also likely to cause changes to food resources in the area. These types of changes can potentially result in both negative and positive impacts for birds.

Marine fish farms reduce the availability of habitat for surface feeding seabirds, both by the direct presence of cages and other structures and by fragmentation of habitat resulting in patches (such as gaps between cages) that are too small for effective exploitation. They may also cause changes to the benthic habitat beneath the farm, affecting prey resources for benthic feeding seabirds. In practice, given the large foraging ranges of most seabird species, and the spatio-temporal variability in the distribution of their prey resources, such impacts are likely to be negligible in most cases. Exceptions might apply if the fish farm is located close to a breeding colony, or in a localised patch of very productive habitat. The proposed fish farm site is not close to any breeding colonies of the SCIs considered in this assessment. The benthic habitat conditions in the proposed fish farm site has been described as “broadly unremarkable and reflect the range of substrates present” and “the observed marine communities constitute commonly-recorded species at a normal abundance and diversity for north-east Atlantic temperate waters” (Technical Advisor’s Interim Report):

Marine fish farms may also act as fish attractant devices, resulting in aggregations of fish around the fish farms (e.g., Dempster *et al.*, 2002; Sanchez-Jerez *et al.*, 2007) and increased abundance of fish at larger spatial scales (Goodbrand *et al.*, 2013). While this may represent a re-distribution of prey resources, rather than an absolute increase, such aggregations may have significant positive benefits to seabird populations by providing a reliable concentration of prey resources. One study in the western Mediterranean Sea, has shown that Storm Petrel occurred in much higher densities around one marine fish farm compared to the open sea, presumably exploiting such a concentration of prey resources (Aguado-Giménez *et al.*; 2016). In another study in the the southeast Pacific, twofold to fivefold increases in abundances of marine birds around salmon farms compared to control areas were reported (Buschmann *et al.* (2006); however, only brief summary details are available for that study.

The structures introduced by marine fish farms may also provide roost sites for seabirds. This will generally be a positive impact by reducing “the energy expenditure of the birds because they do not have to fly to and from their natural land-based roosting sites, which may be some distance from their foraging areas” (Sagar, 2013).

While the aggregations of fish around the fish farms are generally likely to have positive impacts on the availability of prey resources for seabirds, it is possible that dependence upon these resources could have negative impacts on the seabirds if the farm ceased operation (Aguado-Giménez *et al.*; 2016), while attraction of seabirds to fish farms could have other negative impacts (see below).

Potential disturbance impacts

Disturbance impacts could arise in two ways: i) from avoidance of the structures associated with the salmon farm; and/or ii) from avoidance of human activity associated with the salmon farm.

Avoidance of structures

In general, birds seem to habituate to artificial structures, and even to use them when they provide useful habitat features such as roosting sites. However, birds will avoid artificial structures when they interfere with specific habitat requirements, such as flight paths or maintaining open views to

detect predators. Neither of the latter factors is likely to be an issue in the present case. In a study of mussel farms in the inner part of Bantry Bay, Roycroft *et al.* (2004) found that the farms generally did not have negative impacts on seabird diversity or abundance and some species groups, including auks, were more abundant in the mussel farms compared to the control sites. However, none of the species that are the focus of the present assessment were recorded in their study, reflecting the location of their study sites in the innermost part of Bantry Bay.

Avoidance of human activity

There will be eight full-time husbandry staff employed during operation of the proposed fish farm (EIS), so there is likely to be daily husbandry activity on the proposed fish farm site (as takes place on other large marine salmon farm sites). Site access will be *via* a 15.5 m multi-cat type vessel, which will operate from existing moorings in the Castletownbere Harbour Area or at the Pontoon Pier at Beal Lough (EIS). The EIS does not show the access routes that will be used to/from the fish farm, but indicative straight-line access routes are shown in Figure 3.

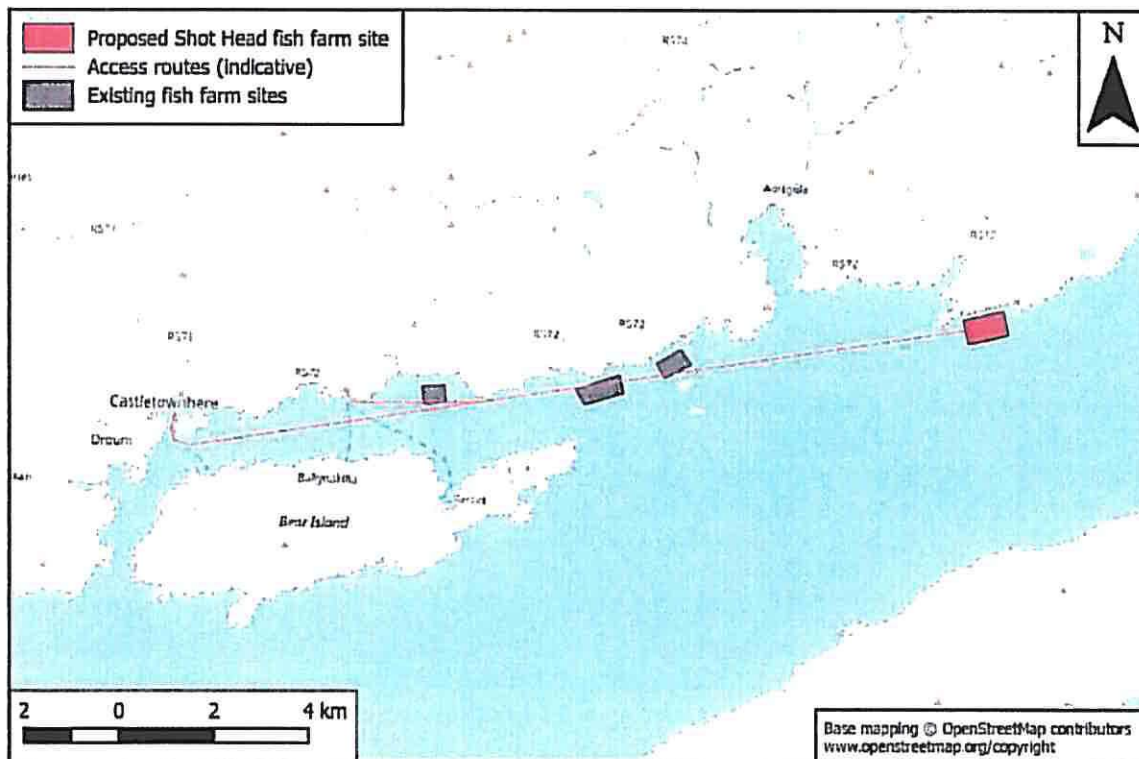


Figure 3. Indicative access routes to/from the proposed Shot Head fish farm.

It is likely that the greatest potential impact from human activity will be associated with boat movements around the sites, while boat movements to/from the site may cause disturbance to birds away from the site. Human activity on the site may also cause some disturbance impacts, resulting in an avoidance zone around the area of activity. Mechanical equipment used on the site may cause noise impacts. However, birds may habituate to pattern of consistent human activity restricted to the cages.

The overall magnitude and significance of any disturbance impacts will depend upon the level and frequency of the activities, the scale of the area affected, whether the affected area coincides with areas of high concentrations of species of interest, and the sensitivity of the species of interest. If species only occur occasionally and/or in low numbers, or the species have low sensitivity to

disturbance, then disturbance impacts are unlikely to be significant. The species of interest for the present assessment generally have low sensitivity to human disturbance (see below).

Potential impact of entanglement with nets

In the proposed fish farm site, the EIS states that dark-coloured top nets will be used to protect the fish against bird predation while it is also noted that “in the event that fence nets are required as protection against seals, this will also protect against diving cormorants”.

Direct mortality of seabirds can occur at marine fish farms through birds drowning after becoming entangled in underwater nets, or being injured after becoming entangled in above-water nets. Therefore, there is a risk that the proposed fish farm site will cause direct mortality of seabirds through entanglement with nets.

The general consensus of opinion appears to be that modern well managed net-pen facilities that use appropriate equipment and predator deterrence methods should have no negative effects on birds (Tucker and Hargreaves, 2008; Belle and Nash, 2008). There do not appear to have been any studies published in Ireland on bird mortality associated with offshore salmon cages, so there is an absence of published data in this regard. Anecdotal evidence, however, suggests that in correctly operated facilities that this is not a significant issue (Bord Iascaigh Mhara, pers. comm., quoted in Gittings and O’Donoghue, 2012). However, some degree of caution must be attached to these opinions due to the lack of specific data on this subject, and there is some evidence of one of the species of interest (Gannet) becoming entangled in nets in marine fish farms (see below).

Lighting

The proposed fish farm site will have “adequate navigational lighting ... to prevent damage arising due to navigational errors by noncompany vessels” (EIS). However, the EIS does not provide any specific details about the types and positions of the navigational lighting that will be provided. Marine lighting can have negative impacts on seabirds, thorough mortalities of birds caused by grounding, or by colliding with structures after being attracted to the lights (e.g. Raine *et al.*, 2007; Miles *et al.*, 2010). Petrels and shearwaters (including Storm Petrel) can be particularly affected as they are often active at night. The overall magnitude and significance of any such impacts from the proposed fish farm site will depend upon the position of the proposed fish farm site in relation to foraging areas and commuting routes used by the species of interest, as well as details of the lighting design and position, while species will only be sensitive to such impacts if they are regularly active at night.

Other potential impacts

Other potential impacts of marine fish farms on seabirds include wider ecosystem impacts, deliberate killing of birds, ingestion and/or entanglement of birds with marine litter introduced by the fish farms and the accumulation of toxins derived from the fish farms.

Fish farms can potentially have wider scale impacts, such as impacts on water quality, or sea lice infestations, which could affect the availability of food resources for seabirds. These issues are discussed elsewhere (e.g., in the Technical Advisor’s Interim Report) and are not considered further in the present assessment.

Deliberate killing of birds, as a predator control method, has been widely practiced in fish farms (e.g., Carrs, 1989). The EIS for the proposed fish farm refers to legal provision allowing the killing of

Cormorants. However, killing of any of the species of interest for the present assessment would be illegal and, it is assumed, that no such killing will occur.

Ingestion of, or entanglement in, marine litter by seabirds is a significant worldwide problem. Fish farms have the potential to generate such litter and, if seabirds are attracted to the fish farms (see above), the farms could have disproportionately large impacts relative to the amount of litter that they generate. However, this is a potential impact that can be avoided by appropriate precautions in the operation of the fish farm.

Aguado-Giménez *et al.* (2016) suggest that Storm Petrels attracted to aggregations of fish at marine fish farm sites could potentially suffer negative impacts from "accumulation of antibiotics, heavy metals or other pollutants derived from aquaculture food or facilities maintenance". This appears to be a speculative potential impact as there does not appear to be any evidence of accumulations of such toxins derived from fish farms in seabirds. If such accumulations do occur, seabirds will only be likely to be vulnerable to such impacts if significant proportions of a population aggregate at fish farm sites.

Vulnerability of the species of interest

Introduction

This section addresses the following part of the brief:

An assessment of the vulnerability of the species of interest, for which each identified site is designated, to salmon aquaculture activity at Shot Head.

For each of the species of interest, an initial review of their distribution patterns and habitat preferences has been undertaken together with their potential sensitivity to impacts from marine fish farms. These reviews are then used to assess their vulnerability to salmon aquaculture activity at Shot Head, based on the likely occurrence patterns in the area and the likely impacts of the fish farm on the birds.

Fulmar (Beara Peninsula SPA)

Distribution and habitat preferences

Fulmar feed in open marine waters and can tolerate severe weather conditions. Stone *et al.* (1995) found that in NW European waters, Fulmars were found mainly in waters of greater than 100 m depth. They are mainly surface feeders but can dive to depths of at least 3 m.

Around the Irish coast, Pollock *et al.* (1997) found that the highest densities of Fulmar from February to May generally occurred well offshore, while they were generally present only at low densities in inshore waters. However, they noted that the Beara Peninsula was an exception to this pattern with high densities being present here. The lowest densities at sea were recorded in June, when Fulmar are incubating. In July to September, Fulmar were widespread over the continental slope, mostly in low to moderate densities, with moderate densities on the Porcupine and Rockall Banks and high densities around the 500 m isobaths.

During the transect surveys carried out by Roycroft *et al.* (2007), Fulmar were recorded along the northern side and outer parts of Bantry Bay. All the sightings were of single flying birds, and Roycroft *et al.* state that Fulmar "did not regularly forage within the bay".

Sensitivity

There does not appear to be any specific information about interactions between Fulmars and marine fish farms. However, Furness *et al.* (2013) rated their potential vulnerability to disturbance by ship and helicopter traffic as 1 out of 5 (where 1 = hardly any escape/avoidance behaviour and/or none/very low fleeing distance, and 5 = strong escape/avoidance behaviour and/or large fleeing distance), indicating that they are unlikely to be significantly affected by disturbance from boat movements associated with marine fish farms.

There are no reported mortalities of Fulmar caused by entanglement in nets at fish farms. Fulmar are active at night and are potentially vulnerable to impacts from navigational lighting.

Assessment

The main concentration of breeding Fulmar within the Beara Peninsula SPA is on Dursey Island, which is around 40 km (as the Fulmar flies) from the proposed fish farm site. However, based on BirdAtlas data, there appear to be some Fulmar nesting throughout the coastal parts of the Beara Peninsula SPA, extending to the eastern end of Bear Island, around 12 km from the proposed fish farm site. In fact, the distribution of nesting Fulmar along the northern side of Bantry Bay probably extends further east and there may be birds nesting along the section of coast adjacent to the proposed fish farm site. However, these birds would not be part of the Fulmar SCI of the Beara Peninsula SPA.

Fulmar have very large foraging ranges and can travel 100s of km from their nesting colonies. Based purely on distance, the proposed fish farm site is within the likely core foraging range of the Fulmar SCI of the Beara Peninsula SPA, including the main Fulmar colony in the Beara Peninsula SPA at Dursey Island. However, Fulmar are a largely pelagic species and it is likely that most birds from colonies within the Beara Peninsula SPA head out to sea to forage.

It is notable that no foraging Fulmar were recorded by the transect surveys carried out in Bantry Bay by Roycroft *et al.* (2007). The distribution of flying birds that they recorded reflects the likely distribution of nesting colonies in Bantry Bay, and these birds were likely to have been mainly travelling between these nesting colonies and offshore foraging grounds. However, the transect surveys did not include any of the existing fish farm sites in Bantry Bay, so it is possible that, if Fulmar are attracted to fish farms, the surveys missed local accumulations of birds within Bantry Bay.

The water depth within, and around, the proposed fish farm site (30-40 m) is also substantially shallower than the apparently preferred water depth of foraging Fulmar (100 m).

Overall, therefore, while small numbers of Fulmar are likely to occur in the vicinity of the proposed fish farm site, these are likely to be mainly birds travelling to/from nearby colonies, rather than foraging birds. Fulmar are unlikely to be sensitive to disturbance impacts from the fish farm operation. As these birds will be travelling, rather than foraging, the probability of the birds interacting with proposed fish farm site is minimal, unless Fulmar are attracted to marine fish farms. However, as any nearby colonies will be outside the SPA, any Fulmar occurring in the vicinity of the proposed fish farm site are unlikely to be part of the Fulmar SCI of the BB SPA.

Storm Petrel (Bull and the Cow Rocks SPA)

Distribution and habitat preferences

Storm Petrels feed in open marine waters and can tolerate severe weather conditions. Stone *et al.* (1995) found that in NW European waters, Storm Petrels were found mainly in waters of greater than 100 m depth. They are mainly surface feeders with a diet including "crustaceans, small fish, medusae, cephalopods, and oily and fatty materials" (Cramp and Simmons, 2004).

While Storm Petrels are generally considered to be pelagic seabirds, they can come close inshore and have been recorded feeding on intertidal isopods during the breeding season (D'Elbee and Hemery, 1988) and on migration (Thomas *et al.*, 2006). These isopods are presumed to be taken on nocturnal high tides when the isopods migrate vertically into the water column. During the breeding season, exploitation of intertidal food resources was considered to take place close to the breeding colony, when nest relief and chick feeding occurs (D'Elbee and Hemery, 1988).

Around the Irish coast, Pollock *et al.* (1997) found that Storm Petrel numbers were low in May and June with most birds over the continental shelf to the west and south-west, and with the highest densities close to the breeding colonies off Kerry. In July and August, very high densities were recorded off south-west Ireland with high densities also in the Celtic Sea and the approaches to the English Channel.

Storm Petrels were not recorded during the transect surveys, or from shore based surveys, carried out by Roycroft *et al.* (2007) in Bantry Bay. However, they were recorded during shore-based surveys carried out at Three Castles Head on the northern side of the Mizen Peninsula.

Sensitivity

Recent work in the Mediterranean by Aguado-Giménez *et al.* (2016) has shown that Storm Petrels can be attracted to marine fish farms. They studied the aggregation of Storm Petrels around two marine fish farms in the western Mediterranean Sea. The fish farms were farming Gilthead Seabream (*Sparus aurata*), European Seabass (*Dicentrarchus labrax*) and Atlantic Bluefin Tuna (*Thunnus thynnus*). One farm was located close inshore (around 0.7 km from the coast), while the other farm was farther offshore (around 4.65 km off shore). Storm Petrels only occurred at the offshore farm, but Storm Petrel densities were one and two orders of magnitude here compared to densities recorded in "Mediterranean natural hotspots for this species". Analysis of regurgitates indicated that aquaculture-derived wastes were not a significant food resource for the petrels visiting this farm. The authors conclude that the interaction between the fish farm and the petrels may have both positive and negative impacts. The farm provided a concentration of food resources close to the breeding colony, which probably had energetic benefits for the petrels by reducing the travel distances and foraging time required for chick provisioning. However, potential negative impacts could arise from "accumulation of antibiotics, heavy metals or other pollutants derived from aquaculture food or facilities maintenance", while dependence upon the farm could also have negative impacts in the farm ceased operation.

Storm Petrels are generally not very sensitive to disturbance. They regularly follow boats and ships and can be attracted close to vessels by "chumming"³. Furness *et al.* (2013) rated the potential vulnerability of Storm Petrels to disturbance by ship and helicopter traffic as 1 out of 5 (where 1 = hardly any escape/avoidance behaviour and/or none/very low fleeing distance, and 5 = strong

³ Deposition of fish wastes, etc., off the back of a boat to attract seabirds.

escape/avoidance behaviour and/or large fleeing distance), indicating that they are unlikely to be significantly affected by disturbance from boat movements associated with marine fish farms.

There are no reported mortalities of Storm Petrels caused by entanglement in nets at fish farms. However, this may reflect the fact that they are only likely to occur at a minority of fish farms (offshore farms close to breeding colonies). Storm Petrels are active at night and are potentially vulnerable to impacts from navigational lighting.

Sensitivity

Marine fish farms may have significant positive impacts on Storm Petrels by providing concentrated food resources although there are also potential negative impacts (Aguado-Giménez *et al.*'s, 2016; see above).

The Storm Petrel breeding colony in the Bull and the Cow Rocks SPA is located outside Bantry Bay. As Storm Petrels are largely pelagic, it is not surprising that no Storm Petrels were recorded within Bantry Bay during the seabird surveys carried out by Roycroft *et al.* (2007).

Storm Petrels are known to be attracted to marine fish farms (Aguado-Giménez *et al.*'s, 2016; see above), and the transect surveys carried out by Roycroft *et al.* did not include any of the existing fish farm sites in Bantry Bay. However, if significant numbers of Storm Petrels were travelling in to Bantry Bay to feed in any of these sites, it seems likely that some travelling birds would have been detected in their surveys. Furthermore, all the existing fish farm sites in Bantry Bay, as well as the proposed fish farm site, are within around 500 m of the shore, while in Aguado-Giménez *et al.*'s (2016) study, Storm Petrels did not occur in the inshore fish farm, despite it being closer to the breeding colony than the offshore fish farm.

There is some evidence that, at night, Storm Petrels may feed close inshore, so there is a theoretical possibility that nocturnal usage of Bantry Bay occurs, which would not have been detected by Roycroft *et al.*'s (2007) surveys. However, during the breeding season this is likely to only occur close to their colonies. Therefore, any nocturnal inshore feeding by the Storm Petrel breeding colony in the Bull and the Cow Rocks SPA is unlikely to take place within Bantry Bay.

Overall, therefore, it is very unlikely that there is any significant spatial overlap between foraging Storm Petrels from the Bull and the Cow Rocks SPA and the proposed fish farm site. Therefore, development of the proposed fish farm is unlikely to have any impacts on the Storm Petrel SCI of the Bull and the Cow Rocks SPA.

Gannet (Bull and the Cow Rocks SPA)

Distribution and habitat preferences

Around the Irish coast, Pollock *et al.* (1997) found that Gannets were recorded in highest densities in offshore waters between February and May, with large concentrations along the shelf break to the west and south-west, which may have been linked with fishing activity. From June to August, distribution patterns were linked to breeding colonies. Very high densities were recorded close to breeding colonies at the Skelligs off south-west Ireland and Ailsa Cragg, off north-east Ireland, with high numbers in the Celtic Deep off south-east Ireland. Away from the breeding colonies, Gannets were ubiquitous at low densities on the continental shelf and in the Irish Sea.

During the transect surveys carried out by Roycroft *et al.* (2007), Gannets were "distributed ubiquitously throughout the bay in relatively low mean densities (max 3/km²), with the highest mean

density occurring at the mouth of the bay". However, the overall mean density of Gannets across Bantry Bay recorded by their surveys was 0.16 birds/km². This compares to densities in the hotspots recorded by Pollock *et al.* (1997) of over 5 birds/km².

Sensitivity

Gannets have been recorded visiting marine fish farms, and being caught in nets, but their visits appear to be irregular (NCC, 1989). In Scotland, Gannets were not recorded in an intensive two year study of marine fish farms in Argyll (Carrs, 1988), but they have been recorded as being drowned in anti-predator nets at Scottish marine fish farms (Carrs, 1994). In Ireland, Gannets have been recorded at two salmon farms off the north-west coast, where single birds visited each site two or three times per year after stormy weather (NCC, 1989). The birds were recorded plunge-diving into Bridgestone cages moored about 200 m offshore. These cages were not protected by nets but had twine stretched across them. Once in the cage, the birds were trapped in by the twine and would dive from the surface to take fish from the cage. During the transect surveys carried out by Roycroft *et al.* (2007), Gannets were never observed visiting the fish farms off Gearhies on the southern side of the bay, which were around 1 km from the transect route (Daphne Roycroft, pers. comm.). The EIS for the proposed fish farm site note that "on very rare occasions ... diving gannets may become trapped in bird nets". It is not clear to what extent entanglement of Gannets in nets at marine fish farm causes mortalities (e.g., birds trapped on the surface could be released by husbandry workers before they suffer injury).

Furness *et al.* (2013) rated the potential vulnerability of Gannets to disturbance by ship and helicopter traffic as 1 out of 5 (where 1 = hardly any escape/avoidance behaviour and/or none/very low fleeing distance, and 5 = strong escape/avoidance behaviour and/or large fleeing distance), indicating that they are unlikely to be significantly affected by disturbance from boat movements associated with marine fish farms.

Gannets are not active at night (Garthe *et al.*, 1999b, 2003), so they are not potentially vulnerable to impacts from navigational lighting.

Assessment

Gannets regularly occur close inshore and come into sheltered bays and mouths of estuaries to feed. Therefore, it is not surprising that they were recorded quite widely feeding within Bantry Bay in the surveys carried out by Roycroft *et al.* (2007). These birds would have presumably come from the breeding colony on the Bull and the Cow Rocks SPA.

Gannets have been recorded visiting marine fish farms, although, from the very limited available evidence, it seems that such visits are infrequent. While Gannets visiting marine fish farms may benefit from the availability of concentrated food resources, potential negative impacts may arise from direct mortality of birds caught in nets.

Given the widespread distribution of Gannets in Bantry Bay and the evidence that they can be attracted to marine fish farms, some interaction between the Gannet SCI of the Bull and the Cow Rocks SPA and the proposed fish farm is likely to occur. Therefore, there is a risk of negative impacts. However, given the likely foraging range of birds from the Bull and the Cow Rocks SPA colony, and the relatively low densities that occur within Bantry Bay, the proportion of birds from the colony interacting with the proposed fish farm is likely to be very low. As anecdotal evidence indicates that Gannets appear to only be occasional visitors to marine fish farms, and Gannet mortalities appear to be rare, it is unlikely that the proposed fish farm would cause a large number of mortalities.

However, it is necessary to consider what level of mortality might result in a significant impact on the Gannet SCI of the Bull and the Cow Rocks SPA.

The relevant conservation objective to consider for this issue is the objective that there will be no significant decline in the breeding population. As Gannets are long-lived birds, a small increase in annual mortality rates could cause a significant decline. In the assessment of collision risk from wind farm developments, a precautionary threshold of a 1% increase in the annual mortality rate is widely used to assess the potential significance of collision mortalities (Percival, 2003)⁴. Assuming a population size of 12,776 adults (6,388 AOS) and an annual adult survival rate of 0.919 (Wanless *et al.*, 2005), around ten mortalities per year would cause a 1% increase in the annual adult mortality rate of the Bull Rock Gannet colony. From the anecdotal evidence, it seems unlikely that a single fish farm would cause this level of mortality, and it should also be noted that the Bull Rock Gannet colony has more than doubled in size over the period during which the existing fish farms in Bantry Bay have been operating. Furthermore, the 1% threshold may be very precautionary. However, the apparent lack of systematic recording of bird mortalities associated with marine fish farms limits the confidence that can be attached to the above assessment.

Puffin (Bull and the Cow Rocks SPA)

Distribution and habitat preferences

Puffins feed in open marine waters and can tolerate severe weather conditions. Around the Irish coast, Pollock *et al.* (1997) found that Puffins were generally found close to their breeding colonies in April and May, becoming more widely distributed, although mostly at low densities in June to August. However, they were scarce offshore and in the Celtic Sea.

Puffins were not recorded during the transect surveys, or from shore based surveys, within Bantry Bay, carried out by Roycroft *et al.* (2007). However, they were recorded during shore-based surveys carried out at Sheep's Head, Dursey Island, Black Ball Head, Mizen Head and Three Castle Head.

Sensitivity

There does not appear to be any specific information about interactions between Puffins and marine fish farms. However, Furness *et al.* (2013) rated their potential vulnerability to disturbance by ship and helicopter traffic as 2 out of 5 (where 1 = hardly any escape/avoidance behaviour and/or none/very low fleeing distance, and 5 = strong escape/avoidance behaviour and/or large fleeing distance), indicating that they are unlikely to be significantly affected by disturbance from boat movements associated with marine fish farms.

There are no reported mortalities of Puffins caused by entanglement in nets at fish farms. However, this may reflect the fact that they are only likely to occur at a minority of fish farms (offshore farms close to breeding colonies).

Assessment

The Puffin breeding colony in the Bull and the Cow Rocks SPA is located outside Bantry Bay. As Puffin mainly occur in offshore and pelagic waters, it is not surprising that no Puffin were recorded within Bantry Bay during the seabird surveys carried out by Roycroft *et al.* (2007).

⁴ Note that the 1% threshold refers to the relative increase in mortality rate, not the absolute value of the increase: i.e., if the baseline mortality rate is 20%, a 1% increase in mortality rate has an absolute value of 0.2%.

Given, the absence of Puffin from Bantry Bay, it is very unlikely that there is any significant spatial overlap between foraging Puffin from the Bull and the Cow Rocks SPA and the proposed fish farm site. Therefore, development of the proposed fish farm is unlikely to have any impacts on the Puffin SCI of the Bull and the Cow Rocks SPA.

Lesser Black-backed Gull (Deenish Islands SPA and Puffin Island SPA)

Distribution and habitat preferences

Lesser Black-backed Gulls have wide habitat associations and can feed in open marine waters, coastal waters and estuaries, and inland fields and wetlands. Dietary studies have helped in understanding the range of habitats used by nesting Lesser Black-backed Gulls, and the variation in habitat usage between colonies.

Lesser Black-backed Gulls are omnivorous and can utilise a wide array of energy sources, consuming fish, small mammals, invertebrates, plant material, rubbish, fish discards, etc. (Cramp and Simmons, 2004). While they are capable of obtaining food by dipping to surface, shallow plunging and aerial pursuit of prey, a large portion of their diet seems to come from kleptoparasiting food from other birds (both inter- and intra-specific). It is also generally accepted that open sea fish feeding contributes more to the diet of the Lesser Black Backed Gull than scavenging compared to other large gulls (studies quoted by Cramp and Simmons, 2004).

The diet of Lesser Black-backed Gulls has been studied at the Magharee Islands in Kerry (Kelly, 2009). The diet was dominated by terrestrial beetles, marine fish and anthropogenic garbage (54.3%, 27.4% and 20.2%, respectively). At two German North Sea colonies, the diet was dominated by marine fish and open sea crabs indicating that the birds were mainly feeding at sea (Kubetzki and Garthe, 2003). However, at another German North Sea colony, during the incubation period the gulls fed mainly upon crustaceans and molluscs from the intertidal zone, but during chick-rearing, they took mainly crustaceans and fish which were gathered mostly as trawler discards (Garthe *et al.*, 1999a). At a breeding colony at Texel, the diet was dominated by marine fish (Camphuysen, 2011).

During the transect surveys carried out by Roycroft *et al.* (2007), large gulls were recorded throughout Bantry Bay, but with higher densities in the outer half compared to the inner half (maximum densities of 11-33 birds/km² compared to 6-10 birds/km²). The overall mean density was 2.4 birds/km². The large gulls consisted of "Great Black-backed Gulls, Herring Gulls and Lesser Black-backed Gulls in equal proportions (although the majority of sightings were not identified to species level)". Lesser Black-backed Gulls were recorded from all six vantage points used by Roycroft *et al.* (2007) for the land-based vantage point watches. It should be noted that breeding Lesser Black-backed Gulls are widely distributed around the west Cork and south Kerry coastlines (Balmer *et al.*, 2013). Therefore, the majority of Lesser Black-backed Gulls occurring in Bantry Bay in summer are likely to come from closer colonies, rather than from the distant colonies in Deenish Islands SPA and Puffin Island SPA.

Sensitivity

While gulls are generally likely to visit marine fish farms, there do not appear to be any specific references to Lesser Black-backed Gulls. NCC (1989) do not include Lesser Black-backed Gulls in the three species of gull that they describe as being "commonly mentioned in relation to fish farming on the Scottish west coast". During the transect surveys carried out by Roycroft *et al.* (2007), Lesser Black-backed Gulls were never observed visiting the fish farms off Gearhies on the southern side of the bay, which were around 1 km from the transect route (Daphne Roycroft, pers. comm.). The

lower reliance on scavenging by Lesser Black-backed Gulls (see above) compared to other large gulls might tie in with a lower probability of visiting marine fish farms.

Gulls are generally very tolerant of human disturbance. Furness *et al.* (2013) rated the potential vulnerability of Lesser Black-backed Gulls to disturbance by ship and helicopter traffic as 2 out of 5 (where 1 = hardly any escape/avoidance behaviour and/or none/very low fleeing distance, and 5 = strong escape/avoidance behaviour and/or large fleeing distance), indicating that they are unlikely to be significantly affected by disturbance from boat movements associated with marine fish farms.

Despite the frequent association of gulls with marine fish farms, there do not appear to be any specific references to gull mortalities caused by entanglement in nets at fish farms. This may reflect their behaviour, if they visit the farms to scavenge on feed and waste materials, rather than trying to catch fish within the cages. Also, gulls may be more adept at avoiding entanglement in nets, due to their better agility on land compared to other seabirds.

Lesser Black-backed Gulls, in common with other gulls, are not usually active at night, so they are not potentially vulnerable to impacts from navigational lighting.

Assessment

The proposed fish farm site is within the likely core foraging range distance of the Lesser Black-backed Gull colonies in the Deenish Islands SPA and the Puffin Island SPA. However, it is still a long way from these colonies, and, if birds from these colonies have a preference for feeding in more sheltered coastal waters, they may be more likely to use Kenmare Bay, rather than travelling around the Beara Peninsula to Bantry Bay.

Marine fish farms are likely to have generally positive impacts on gulls, due to the provision of resources for scavengers. However, Lesser Black-backed Gulls may be less likely to visit marine fish farms compared to other large gulls due to their lower reliance on scavenging. There also does not appear to be any evidence of gull mortalities at marine fish farms due to entanglement with nets.

Overall, therefore, due to the relatively low probability of Lesser Black-backed Gulls from the Deenish Islands SPA and Puffin Island SPA colonies occurring in significant numbers in Bantry Bay, and the lack of evidence of negative impacts of marine fish farms on gulls, development of the proposed fish farm is unlikely to have any negative impacts on the of Lesser Black-backed Gull SCIs of Deenish Islands SPA and Puffin Island SPA.

Cumulative impacts

Introduction

This section addresses the following part of the brief:

An evaluation of the potential cumulative or combined impacts of the wider aquaculture activity in Bantry Bay, with an assessment of the contribution to direct and indirect adverse impacts (if any) that the additional Shot Head fish farm is likely to make on the bird resource.

Storm Petrel and Puffin, and significant numbers of Lesser Black-backed Gulls from Deenish Islands SPA and Puffin Island SPA, are unlikely to regularly occur within Bantry Bay (see above), so these species are not discussed in this section.

Aquaculture activity in Bantry Bay

Licensed aquaculture activity in Bantry Bay is shown in Figure 4.

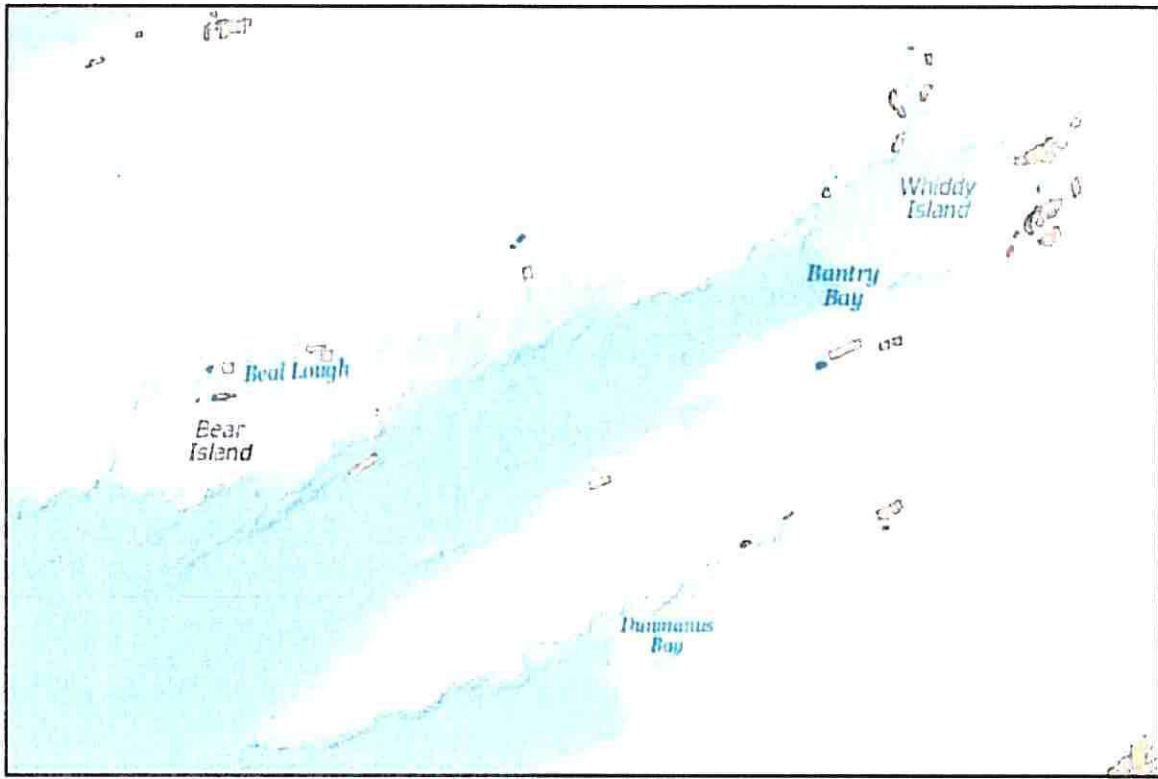


Figure 4. Aquaculture sites in Bantry Bay.

The following description is provided of aquaculture activity in the outer part of Bantry Bay (west of Whiddy Island) in the *Screening Matrix for Aquaculture Activities in Outer Bantry Bay, Co. Cork* (DAFM, undated1):

Oysters, clams, abalone, urchins, scallop, mussels and finfish are cultured in Bantry Bay. In addition, there are applications to culture macroalgae (Kelp).

Oyster culture is carried out using bags and trestles in the intertidal zone. The trestles are arranged in rows along the shore to maximise water movement over the oysters in the bags.

Intertidal clam culture is carried out on mud and sand flats by placing the smaller seed clams in boxes of sediment and covered by mesh. As they grow the clams are spread directly into the sediment and covered by netting to prevent predation.

Abalone and urchins are cultured in tanks on land or in cage structures in the lower intertidal and subtidal areas. They are contained at all times.

The mussels are cultured using longlines. A long-line supported by a series of small floats joined by a cable or chain and anchored at the bottom on both ends is employed. Mussel spat (seed) is collected on ropes or strings (droppers) are suspended on the line. From each of the lines there are a number of dropper lines (up to 5m in length). The depth of the droppers, which is directly related

to the quantity of mussels being cultured, is dependent upon a number of factors including water depth, the floatation provided and the carrying capacity of the system.

Scallops are cultured intensively (bags suspended from longlines) and extensively (spread on the seafloor and harvested via dredging and/or diving).

Finfish are contained in floating cage structures arranged in a grid system, which are secured to the seabed via ropes attached to anchors. Finfish are imputed into the cages as smolts and following a period of 18-24 months are harvested.

Kelp is cultured using longlines supported by floating structures similar to those used for mussel culture.

The following description is provided of aquaculture activity in the Glengarriff Harbour area in the *Screening Matrix for Shellfish Culture in the Glengarriff Harbour and Woodland SCA, Co. Cork* (DAFM, undated2):

The mussels in Glengarriff Harbour are cultured using longlines. A long-line supported by a series of small floats joined by a cable or chain and anchored at the bottom on both ends is employed. Collected mussel spats on ropes or strings (droppers) are suspended on the line. From each of the lines there are a number of dropper lines (up to 5m in length). The depth of the droppers, which is directly related to the quantity of mussels being cultured, is dependent upon a number of factors including water depth, the floatation provided and the carrying capacity of the system.

The mussel sites in the innermost part of Bantry Bay are not covered by the above descriptions, but it is presumed that these are also longline sites.

Interactions with the species of interest

Fulmar (Beara Peninsula SPA)

The Fulmar that occur in the outermost part of Bantry Bay (from around Bear Island outwards) are likely to include birds from breeding colonies in the Beara Peninsula SPA. These Fulmar may spatially overlap with aquaculture sites in the outer part of Bantry Bay, particularly the mussel site on the southern side of Bear Island. However, based on the surveys by Roycroft *et al.* (2007), any spatial overlap is likely to mainly involve birds travelling to/from their breeding colonies, rather than feeding birds. Therefore, there does not appear to be any potential for interaction between these Fulmar and the aquaculture sites.

The Fulmar that occur in the rest of Bantry Bay are likely to be mainly from breeding colonies outside the Beara Peninsula SPA. Therefore, interactions between these Fulmar and aquaculture sites are not relevant to assessment of cumulative impacts on the Fulmar SCI of the Beara Peninsula SPA.

Gannet (Bull and the Cow Rocks SPA)

Foraging Gannet from the Bull and the Cow Rocks SPA colony are likely to occur throughout most of Bantry Bay and, therefore, overlap spatially with most of the aquaculture sites in Bantry Bay, although they are likely to overlap more frequently with the sites in the outermost part of the bay.

As discussed above for the proposed fish farm site, there is potential for negative impacts from the five existing fish farm sites from direct mortality of birds caught in nets. While such mortalities are likely to be rare events only a relatively small number of mortalities (around ten) would be required to cause a potentially significant increase in the annual mortality rate of the Bull and the Cow Rocks

SPA colony (albeit using a threshold of significance that is likely to be very precautionary). Including the proposed fish farm site, there will be six fish farms in Bantry Bay. Therefore, 1.7 mortalities per fish farm site would be enough to cause a potentially significant increase in the annual mortality rate of the Bull and the Cow Rocks SPA colony.

Gannets were not recorded in a detailed study of interactions between mussel longline farms and seabirds carried out by Roycroft *et al.* (2004). The mussel longline sites were near Whiddy Island in the inner part of Bantry Bay, so the potential for Gannet interactions with the sites may have been lower than with sites farther out in the bay. However, Gannet were recorded by Roycroft *et al.* (2007) in this part of the bay, so, given the intensive nature of Roycroft *et al.*'s (2004) study, some Gannet should have been recorded if they are likely to regularly visit mussel longline farms. Therefore, it is unlikely that there are any significant interactions between Gannet and mussel longline sites in Bantry Bay. Furthermore, mussel longline sites do not contain any nets or other structures that are likely to trap Gannet, so any impact on foraging Gannet is likely to be neutral.

Clams and oysters in Bantry Bay are cultivated in the intertidal zone. These sites are covered by water at high tide, so, in theory, there could be overlap between foraging Gannet and the sites. However, as the sites are, necessarily, close inshore, any such overlap is likely to be very minor. Furthermore, these sites do not contain any nets or other structures that are likely to trap Gannet, while the oyster trestles are likely to act as fish attractant devices, so any impact on foraging Gannet is likely to be neutral or positive.

Scallops are cultured using similar methods (longlines) as the mussels, and there only appears to one licensed scallop farm in Bantry Bay (although scallops may be cultivated as a secondary species in some of the mussel or oyster farms). Therefore, it is unlikely that there are any significant interactions between Gannets and scallop sites in Bantry Bay.

Excluding land-based sites, there only appears to be one licensed abalone farm in Bantry Bay, which is located in the subtidal zone on the northern side of Bear Island. Gannets are unlikely to be attracted to abalone farms as they do not feed on shellfish.

Cumulative impacts

Fulmar (Beara Peninsula SPA)

The assessment of both the proposed fish farm site, and of the other aquaculture sites within Bantry Bay, concluded that there was no potential for significant interactions with the Fulmar SCI of the Beara Peninsula SPA. Therefore, it can be concluded that cumulative impacts from the development of the proposed fish farm site in-combination with wider aquaculture activity in Bantry Bay are unlikely to occur.

Gannet (Bull and the Cow Rocks SPA)

There is potential for both the proposed fish farm site, and the other fish farm sites in Bantry Bay, to cause direct mortality of Gannet through birds being caught in nets at these sites. Such mortalities are likely to be rare events although, clearly, as the number and extent of such sites increases, the likely frequency of such mortalities will increase. The development of the proposed fish farm site will cause a 20% increase in the number of fish farm sites in Bantry Bay and a 48% increase in the total area of fish farm sites (although not all of the area of each site is actually used for cultivation).

Given the likely foraging range of birds from the Bull and the Cow Rocks SPA colony, and the relatively low densities that occur within Bantry Bay, the proportion of birds from the colony

interacting with the fish farm sites is likely to be very low. Anecdotal evidence indicates that Gannet appear to only be occasional visitors to marine fish farms, and Gannet mortalities appear to be rare. However, only 1.7 mortalities per fish farm per year would be required to cause a potentially significant increase in the mortality rate of the Gannet colony in the Bull and the Cow Rocks SPA.

Without further information on likely Gannet mortality rates at fish farm sites, and/or more detailed analysis of Gannet population dynamics, it is not possible to assess whether the combined effect of all the fish farm sites in Bantry Bay would result in a significant level of mortality to the Gannet colony in the Bull and the Cow Rocks SPA.

Evaluation of the existing EIS and EIA

Introduction

This section addresses the following part of the brief:

An evaluation of the existing EIS and EIA and in the context of the requirement (or not) of an Appropriate Assessment consistent with Article 6(3) and 6(4) of the Habitats Directive (92/43/EEC), providing an opinion on whether further or supplementary screening is appropriate.

Evaluation of the EIS

Content

The EIS contains limited information about bird populations in Bantry Bay and the potential impacts of the proposed fish farm.

Section 3.4.12, entitled *Predator control; birds* discusses “the likelihood of and control of intrusive bird activities” at the proposed fish farm site. This includes the following text:

“Cormorants are the most persistent avian predators of farmed fish. They are capable of breaching the cage nets underwater and on occasions will also breach bird nets, to predate on the salmon stock. There was controversy for some years regarding the protection of the cormorant under Annex I of the Birds Directive. This protection was removed in 1997, mainly because of the evident success of cormorants as fish-eaters and scavengers, following their near extinction in the past.

There is at least one nationally important breeding colony of cormorants in Bantry Bay but experience at the MHI Roancarrig site suggests that cormorant should not prove problematic at the proposed Shot Head site as long as the stock is adequately protected. In the event that fence nets are required as protection against seals, this will also protect against diving cormorants.”

This text implies that killing of Cormorants would be legally permitted if they become a problem at the proposed fish farm, although it is not clear whether it is envisaged that any such killing would take place.

Section 5.3.3, entitled *Conservation measures: birds*, contains a brief review of bird interests in the Bantry Bay area. This includes reviews of designated sites (including sites that are designated for non-bird interests), as well as lists of marine and non-marine bird species recorded in Bantry Bay (from the *Bantry Bay Biodiversity Plan*). However, the Bull and the Cow Rocks SPA is not mentioned in this review.

The section also includes the following assessment of potential seabird interactions with the fish farm:

*"There is no doubt that a variety of seabirds interact with salmon farm sites at a low level, in particular at dawn and dusk, when staff are absent. As discussed in Section 3.4.12, cormorants in particular can be persistent predators if adequate and secure protection measures, in particular bird nets, are not in place. On very rare occasions, heron and diving gannets may become trapped in bird nets. It could also be argued that gulls in particular, as well as some adventurous non-seabird species, such as the hooded crow (*Corvus cornix*) do become more evident on farm sites if salmon feed is available to them. However, the advent of feed barges and the positioning of feed spreaders close to the water, beneath the protective cover of bird nets, prevents such activities."*

The section concludes that:

"In overview, it is submitted that, whilst a number of bird species, occupying either terrestrial and marine habitats on the lists provided, are specifically protected, either within designated breeding areas around the bay or within the protected status Annexes to the Birds Directive, neither the location nor the activities at the proposed Shot Head site are expected to impact on local bird populations for the reasons given. In the particular case of terrestrial habitat species, they are without exception too far removed from the site to be considered at risk at any level."

Section 4.6 and 4.7 of the EIS include assessments of the cumulative impacts of discharges from all of the salmon farm sites in Bantry Bay. However, the EIS does not include a specific section on other cumulative impacts and there is no assessment of potential cumulative impacts to bird populations.

The EIS does not include any mitigation measures designed to reduce potential impacts to birds.

Evaluation

The EIS for the proposed fish farm site contains a very superficial assessment of potential impacts on bird populations and does not make any reference to the Bull and the Cow Rocks SPA. There is some discussion of the potential for various birds to be attracted to the fish farm site, although this discussion appears to be framed more in the context of predator control, rather than the impact on the bird populations. It is not clear from the EIS what specific anti-predator measures will be deployed and what the likely impacts of these will be on birds. There is mention of the potential that "on very rare occasions, heron and diving gannets may become trapped in bird nets", but no further discussion, or assessment, of this potential impact is provided. There is also no assessment of potential cumulative impacts on birds of the development of the proposed fish farm site in combination with wider aquaculture activity in Bantry Bay.

Overall, therefore, in the context of the present assessment, the EIS does not provide an adequate assessment of potential impacts on all the SPAs for which there is potential for interaction between their SCIs and the proposed fish farm site.

In a wider context, the EIS does not meet the statutory requirements as it does not contain an adequate assessment of potential impacts on bird populations. In particular, there are important non-SPA bird populations with higher likelihood of potential impacts (e.g., the non-SPA seabird breeding populations on various islands within Bantry Bay). An EIS needs to consider all potentially significant impacts, not just impacts to SPAs. In this context, potential impacts to the nationally important Cormorant colony on Sheellane Island from bird mortalities caused by net entanglement and/or lethal control, and potential impacts to the tern colonies on Roancarrigbeg from disturbance (the island lies close to the likely access route to/from the proposed fish farm site) require detailed

assessment. Furthermore, the EIS also needs to assess potentially positive impacts, as well as negative impacts, such as those that might occur from attraction of birds to the fish farm site.

Evaluation of the EIA

Content

Section 15 of the EIA, entitled *Interactions with Natura 2000 Sites and Protected Species*, contains a listing of Natura 2000 sites "adjacent to the proposed salmon farm site at Shot Head", with details of their Qualifying Interests/SCIs and their distance from the proposed fish farm site. This listing includes two SPAs: the Beara Peninsula SPA and the Sheep's Head to Toe Head SPA.

The only assessment provided of the potential impacts to the SPAs is as follows:

"In view of the largely terrestrial nature of sites 1-5 above [which include the Beara Peninsula SPA and the Sheep's Head to Toe Head SPA] it is considered that these sites are outside the zone of potential impact of the proposed fish farm development at Shot Head. There is no potential "source-pathway-target" vector connecting the proposed site to the Natura 2000 sites and it can be concluded that there will be no significant impacts on their Conservation Objectives."

Evaluation

The EIA for the proposed fish farm site contains no assessment of potential impacts on bird populations and does not make any reference to the Bull and the Cow Rocks SPA. The conclusion that there is "no potential "source-pathway-target" vector" connecting the proposed fish farm site and the Beara Peninsula SPA is clearly incorrect, as Fulmar are a SCI of the Beara Peninsula SPA. Therefore, in the context of the present assessment, the EIA does not provide an adequate assessment of potential impacts on all the SPAs for which there is potential for interaction between their SCIs and the proposed fish farm site. In a wider context, the EIA is also clearly inadequate as it does not consider important non-SPA bird populations which have the potential to interact with the proposed fish farm site.

AA requirements

The EIS and EIA are inadequate, as discussed above. Therefore, further AA screening is required. The present briefing note largely contains the information required for this screening. However, based on the assessment presented here, a stage 2 Appropriate Assessment of the potential impact of Gannet mortalities on the Gannet SCI of the Bull and the Cow Rocks SPA may be required.

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