

AP2/1-14/2015

**Report for the purposes of the Aquaculture Licences
Appeals Board's Appropriate Assessment**

of

a proposed salmon farm at Shot Head, Bantry Bay, Co Cork

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1. Introduction

Pursuant to section 35 of the Fisheries (Amendment) Act 1997, MERC Environmental Consultants have been commissioned by the Aquaculture Licences Appeals Board (ALAB) to complete a report for the purpose of ALAB's Appropriate Assessment (AA) in relation to the potential for a proposed salmon farm development to cause adverse impacts on the conservation objectives for Special Conservation Interests (SCI's) of a number of sites designated as Special Protection Areas (SPA's) under the 2011 Regulations. The assessment report is a necessary undertaking in order to validate the findings of earlier Appropriate Assessment Screening and Natura Impact Statement studies and will support the Board in making a determination in relation to predicted impacts of the proposed development on SCI's for relevant SPA sites.

This report presents the outcome of an assessment of the proposed Shot Head salmon farm in Bantry Bay Co Cork. The proposed farm development location lies outside of any site designated as a SPA or Special Area of Conservation (SAC) under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I 422 of 2011). Under the terms of reference issued by ALAB, this assessment is conducted in the context of the potential for the proposed development to impact on nearby SPA designated sites and associated SCI's only.

The assessment is based on a comprehensive desktop review of existing information submitted as part of the consenting process, either as part of the initial application or in response to requests for further information and/or detailed studies post application or subsequent to the lodgement of appeals in response to the September 2015 Ministerial decision to grant. The assessment has also undertaken a detailed review of published data, technical studies, ecological reports and peer reviewed scientific papers. While a site visit was carried out, no field work was conducted as part of this assessment.

1.2 Bantry Bay

Site description

Bantry Bay is bounded by the landmass of the Beara Peninsula to its north while the Sheep's Head Peninsula comprises its southern boundary. Beara itself is characterised by a central spine of mountains (the Slieve Muckish and Caha Mountains) that extend along the core of the peninsula, the highest point of which is Hungry Hill at 680m. The Sheep's Head Peninsula is much narrower than the Beara Peninsula and is considerably lower in relief. Bantry Bay extends approximately 40km from the inner most point near Ballylickey seawards along its west-south-westerly axis. The subtidal component of Bantry Bay covers an approximate area of 45,000 hectares. Bantry Bay varies in width from approximately 3km at the eastern end to 10km along a line extending from Sheep's Head to the eastern end of Bere Island. West of this can be considered open sea and conditions are completely exposed to the prevailing west to south westerly winds as well as to ocean swell from the Atlantic. Landscape topography and typically low rock

permeability ensure that there are no significant freshwater inflows along the Sheep's Head peninsula and those that do occur on the Beara side are limited in number and are best described as spate rivers, with generally low average water levels during summer months and episodes of largely seasonal high water levels and associated flow rates that are coincident with periods of heavy rainfall.

Bantry Bay and the waters within it are not protected as a European site under any conservation designation. However, coastal features and sections of the shoreline and hinterland are protected under the provisions of European Communities (Birds and Natural Habitats) Regulations 2011 (S.I 422 of 2011), under which some areas and features are designated as SAC's and/or SPA's.

Special Protection Areas

For the purpose of this assessment, all SPAs located within 15 km of the proposed development site are included as per published guidelines¹. However, the guidelines further recommend that where AA is being conducted for projects that may affect sites with water dependent habitats or species it may be necessary to consider the full extent of the catchment, depending on the sensitivities of the ecological receptors, bearing in mind the precautionary principle. Accordingly, a greater number of sites are included in this assessment based largely on the reported mean foraging ranges of respective SCI's as assessed and reported by Gittings (2018).

Applying the above guidelines, the list of designated SPA sites considered relevant to this assessment is therefore as follows:

- Beara Peninsula SPA Site code: 004155
- Iveragh Peninsula SPA Site code: 004154
- Deenish Island and Scariff Island SPA Site code: 004175
- The Bull and The Cow Rocks SPA Site code: 004066
- Skelligs SPA Site code: 004007
- Sheeps Head to Toe Head SPA Site code: 004156
- Puffin Island SPA Site code:004003

Two further SPA sites are located in the surrounding area (Eirk Bog SPA Site code: 004108 and Killarney National Park SPA Site code:004038). Being inland sites located approximately 30km from the proposed farm site they are not host to SCI's that are considered to be potentially at risk of adverse impacts from the proposed farm. Accordingly they have been excluded from further consideration in this assessment.

Figure 1.1 details boundary mapping for Special Protection Areas located in the area surrounding the Beara Peninsula and proposed Shot Head salmon farm location.

¹ *Appropriate Assessment of Plans and Projects in Ireland* – Guidance for planning authorities. Department of the Environment, Heritage and Local Government.

Existing and proposed aquaculture development in Bantry Bay

An extensive number of aquaculture licences are active within Bantry Bay and adjacent bays including Dunmanus Bay and Kenmare River. According to the Department of Agriculture, Food and the Marine (DAFM) as of December 2019, in total there are 72 shellfish licences granted along with three (3) operational marine finfish licences in Bantry Bay (exclusive of the proposed Shot Head site being considered here). Table 1.1 summarises data for existing aquaculture licences in Bantry Bay up to April 2019. New applications are not included in the summary.

Existing licensed aquaculture activity relates to suspended and bottom culture of abalone *Haliotis discus hannai*, sea urchins *Paracentrotus lividus*, mussels *Mytilus edulis*, bottom cultivation of scallops *Pecten maximus*, cultivation of marine algae (dulse and winged kelp/nori), oyster (*Crassostrea gigas*) as well as on growing of finfish - Rainbow trout (*Oncorhynchus mykiss*) and Atlantic salmon (*Salmo salar*). Existing licensed areas are clustered around inner Bantry Bay and Whiddy Island sound, Berehaven Sound, Aghabeg, Glengarriff Harbour and along sections of the northern shore of the Sheeps Head Peninsula. A commercial research facility operates an aquaculture research and development base at Gearies where investigations into algae cultivation, shellfish seed production and prevention and treatment of disease in finfish are carried out. The facility operates a licensed marine aquaculture site and a land based aquaculture licence permit shore based culture and research activity.

Table 1.1: Summary aquaculture licence data for Bantry Bay (up to April 2019)

Licence type*	No.	Area (ha)
Abalone	2	9.75
Kelp	1	25
Mussels	55	368
Oysters	9	20.12
Rainbow trout	1	12
Salmon**	3	66
Scallops	2	6.4
Urchins	1	6
Winged kelp	1	13.6
Total licensed area (ha)	76	526.87

*Excluding land based licences

**Excluding the proposed Shot Head farm

Source: DAFM

At time of writing, a further 24 proposed aquaculture projects in Bantry Bay are at application stage. Applications relate to marine algae, shellfish and land based finfish culture activity. Granting of additional licences in the future is uncertain however it is considered likely that at least some of the pending applications will lead to the granting of aquaculture and foreshore licences for sites within Bantry Bay in the short to medium term (1-5 years).

Figure 1.2 details the location of all currently licensed aquaculture sites in Bantry Bay. The location of the proposed Shot Head site is also indicated.

For the purposes of this assessment it is assumed that all licences are active and operating within the terms of their licences and any conditions attached thereto.

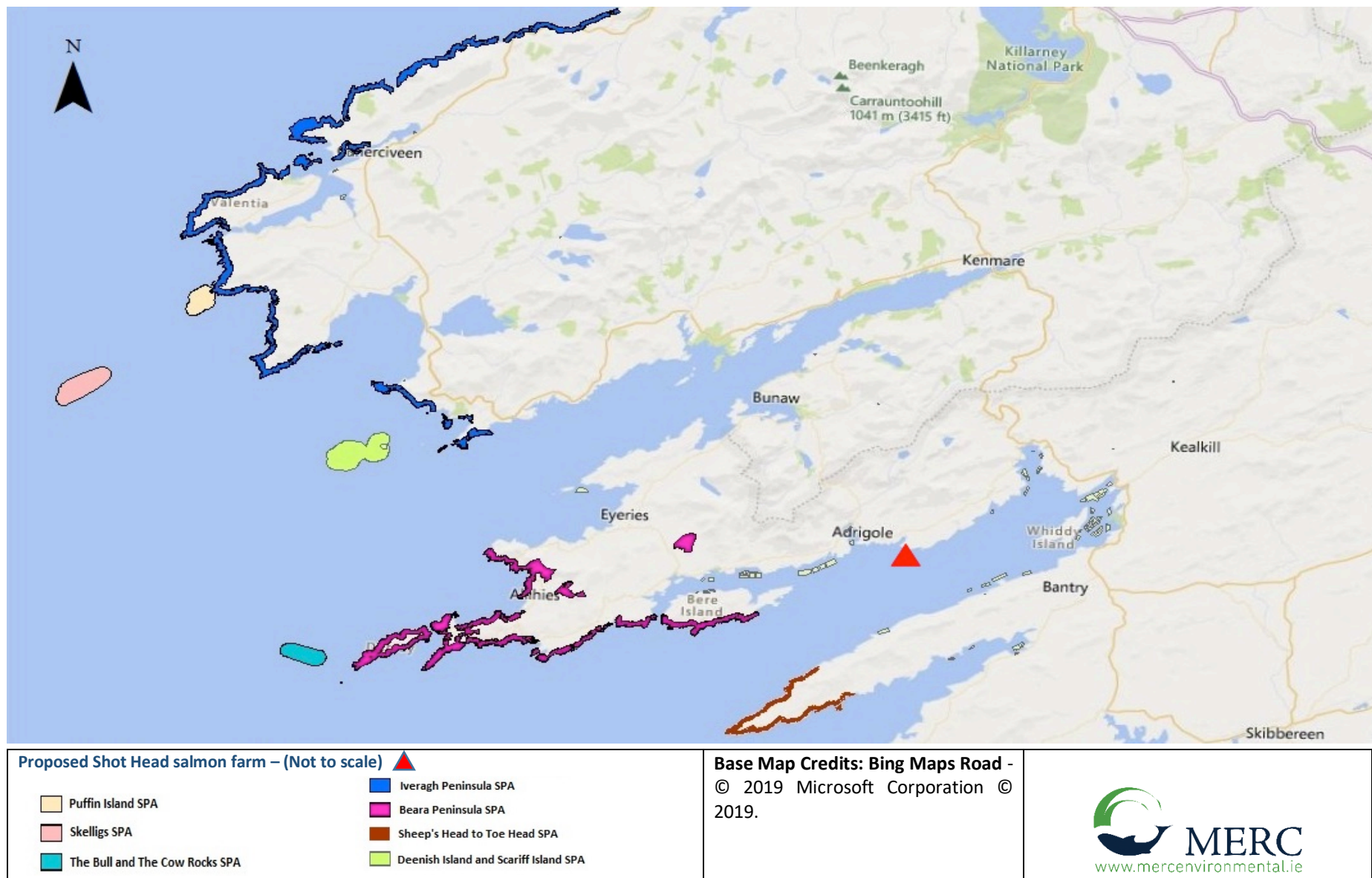


Figure 1.1 Locations of Special Protection Areas in the area surrounding the Beara Peninsula and the proposed Shot Head salmon farm.



Figure 1.2 details the location of all currently licensed aquaculture sites in Bantry Bay.

1.3 Structure of this assessment report

- Section 2 describes the proposed project
- Section 3 details the methodology used in this assessment
- Section 4 details the Connected Natura 2000 sites and lists Conservation Objectives for SCI's within SPA's that are identified as relevant to this assessment
- Section 5 reviews the outcome of AA screening and the Natura Impact Statement
- Section 6 reviews the potential impacts on SCI species
- Section 7 assesses the potential for the Shot Head farm to impact on SCI's in relevant SPA's
- Section 8 presents Concluding statements
- Section presents the outcome of this assessment

2. Details of proposed project

2.1 Background to the proposed project

The proposed farm would have one production site located near Shot Head on the north shore of Bantry Bay as shown in Figure 1.2. The area of the proposed site is 42.5 hectares (850m x 500m). The site would contain a maximum of 16 No. 41m diameter cages with 15m deep nets. The cages would be held in position, in a 8 x 2 cage array, by a submerged mooring grid. A feed barge would also be deployed on the shoreward side of the site. The feed barge would be used to feed the stock automatically via a pipe distribution system using compressed air.

At the start of the production cycle the site would be stocked in October/November with a maximum of 836,000 Atlantic salmon smolts sourced from the applicant's hatcheries in Donegal. At the end of the production cycle, some 17-22 months later, harvesting of the fish would take place on site by pumping the fish into a well boat. It is anticipated that the fish would then be transported to the applicant's facilities at the Fisheries Harbour Centre in Castletownbere for slaughtering and subsequent transfer to chilled road-tanker transport to Donegal to the applicant's facility for processing and packing.

The site would be left fallow between 2 to 4 months post harvesting prior to restocking for the next production cycle. During the preharvest stage, in months 14-22, the number of cages at the site may be increased from 12 to 16 to accommodate groups of fish ready to be harvested. It is anticipated that the Shot Head site would undergo a 2-year production cycle, resulting in the harvest of circa 3,500 tonnes of fish by month 20-22. After this the site would be fallowed for 2-4 months, before restocking for the next cycle at the beginning of Year 3 and so on. The applicant's existing Roancarrig site would be stocked one year after the Shot Head site with harvesting taking place 1 year after the harvesting at Shot Head. It is intended that site service will be provided by a purpose-built 15.5m multi-cat type vessel used for transportation of feed and other freight and general site duties including maintenance and net changing. The site will also be serviced by a 5m Polar Cirkel type workboat. Net cleaning will be carried out using the MV Conamara, which is shared by the applicant's operations in the Southwest. An existing well boat, the 60.4m MV Grip Transporter (or equivalent), which is on permanent lease to the applicant, will be used for a variety of activities that require fish pumping, fish delivery, fish grading and fish bath treatments. The main service vessels will operate from existing moorings either in the Castletownbere Harbour area or at the Pontoon Pier at Beal Lough, east of Castletownbere. Feed supplies will be delivered by road to Castletownbere for transfer to the applicant's vessels for delivery to the site. The operation of the Shot Head site will also involve the use of the applicant's existing shore-based facilities, including an office in Castletownbere and an operations yard on Dinish Island, within the Castletownbere Fishery Harbour Centre. Water

2.2 Proposed farm site

The proposed salmon farm site is located between Shot Head and Mehal Head adjacent to the intertidal foreshore on the northern side of Bantry Bay. The location is approximately 2 kilometres east of the inlet

at Adrigole, 16km east of Castletownbere Harbour and 10km west of Glengarriff Harbour. The centre of the proposed site is approximately 400m seawards of the low water mark. Bathymetric data indicates that the shoreward boundary of the site lies between the 20m and 30m contours whilst the main part of the site (where cage structures will be moored) is located between the 30m and 40m contours, based on lowest astronomical tidal conditions. The location provides adequate depth for operating a salmon farm, while it is sheltered to a significant degree from severe storm and wind conditions by Bere Island to the west and the Beara Peninsula to the north. The site is presently unoccupied by any existing aquaculture user, although there are a significant number of existing aquaculture licences in the vicinity. Evidence was presented at an Oral hearing that parts of the proposed site are used by trap fishermen for harvesting crustaceans.

3. Methodology

3.1 General

With the objective of independently assessing critical aspects of the studies concerning the predicted impacts on SCI species, the assessment reviewed all relevant documentation submitted in relation to the proposed project, information in relation to SCI's at each of the SPA sites and published information in relation to known and potential impacts of cage aquaculture on seabird communities.

This assessment referenced a comprehensive range of relevant European Directives, national legislation and guidance on the appropriate assessment of projects and plans with regard to the implementation of the provisions of Article 6(3) and (4) of the EU Habitats Directive 92/43/EEC. Key references guiding the assessment process included:

- *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna.* Official Journal of the European Communities.
- *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version).*
- *European Communities (Birds and Natural Habitats) Regulations 2011.* SI No. 477 of 2011.
- *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.* European Commission 2018. 7621 final. Office for Official Publications of the European Communities, Luxembourg.
- *Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habits Directive 92/43/EEC.* European Commission, 2002;
- Department of Environment, Heritage and Local Government Circular Letter PD 2/07 and NPWS 1/07, 2007;
- Department of Environment, Heritage and Local Government Circular Letter 1/08 and NPWS 1/08, February 2008;
- Department of Environment, Heritage and Local Government Circular Letter L8/08, September, 2008;
- *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities.* DoEHLG, 2009.

Literature accessed and reviewed included publicly available National Parks and Wildlife Service data sources for SPA sites within a 15km radius of the project area. This included site synopses for each designated site, standard Natura 2000 data forms, published conservation objectives as well as GIS layers (habitats, species and marine community mapping where relevant). In this context, the literature review focussed on acquiring and interpreting a sufficient quantity of relevant ecological data for each SPA site and the associated SCI's.

In relation to impacts of aquaculture on the ecology of species and populations of seabirds, an extensive and detailed online literature search was undertaken. A wide range of relevant published and unpublished literature was identified across a range of document types including peer reviewed journals, specialist

technical reviews and summaries as well as strategic high-level assessments undertaken at the level of governments and administrative bodies as well as non-governmental organisations (NGO's). Evidence provided by the reviewed documentation was used to supplement and update prior knowledge of the assessment team with respect to the evidence base for recorded and potential interactions between marine finfish aquaculture and seabird populations.

It being an assessment, no field surveys were carried out, however a site visit was undertaken for the purposes of developing an overall understanding of the layout and distribution of aquaculture in Bantry Bay as well as of the location of the proposed site and associated planned infrastructure. Weather conditions during the time of the site visit were reasonable and allowed for viewing of the proposed site from shore.

3.2 Data sources

SPA boundaries are derived from National Parks and Wildlife (NPWS) GIS shapefiles as updated during 2019. The location and spatial extent of licensed aquaculture sites were provided as GIS shapefiles by ALAB. Information on the development and current practices of aquaculture activities in Bantry Bay was obtained from a range of documentation including the Environmental Impact Statement (EIS) for the proposed Shot Head farm (MHI, 2015) as well as the Supplemental EIS (MHI, 2018); ALAB Technical Advisor's Interim Report (ALAB, 2018), BIM Annual Survey of Irish Aquaculture (BIM 2017), Aquaculture Stewardship Council initial assessment and annual surveillance reports for ASC certified salmon farms in Bantry Bay (ASC 2016, ASC 2017) and a range of other documentation available online. A Coordinated Local Area Management Schemes (CLAMS) has yet to be established in respect of Aquaculture in Bantry Bay.

Data on Irish breeding seabird colonies was available from the following sources:

Cummins, S., Lauder, C., Lauder, A. & Tierney, T. D. (2019) The Status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. *Irish Wildlife Manuals*, No. 114. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland

Newton, S.F, Harris M.P. & S. Murray (2014) Census of Gannet *Morus bassanus* colonies in Ireland in 2013-2014. *Irish Birds*, Vol 10, No.2

JNCC Seabird monitoring programme: <http://archive.jncc.gov.uk/smp/>

SPA site synopsis: <https://www.npws.ie/protected-sites>

The National Biodiversity Data Centre <https://maps.biodiversityireland.ie/>, provides records of breeding birds in Bantry Bay (Including the 2007-11 breeding bird atlas survey and ESAS Surveys).

Seabird distribution data for Bantry Bay was found in:

Roycroft, D. Cronin, M., Mackey, M, Ingram S, N. O' Cadhla, O. March (2007) Risk Assessment For Marine Mammal And Seabird Populations In South-Western Irish Waters (R.A.M.S.S.I.). Coastal and Marine Resources Centre, University College Cork

Mackey, M., Ó Cadhla, O., Kelly, T.C., Aguilar de Soto, N. and Connolly, N. 2004. Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume 1 – Seabird distribution, density and abundance. *Report on research*

carried out under the Irish Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. University College Cork.

Pollock, C.M., Reid, J.R., Webb, A., and Tasker, M.L. 1997. The distribution of seabirds and cetaceans in the waters around Ireland. *JNCC Report No. 267*

Tracking data for Gannets was found in:

http://www.seabirdtracking.org/mapper/?dataset_id=720, as described in Bodey, T.W, Jessopp M. J., Votier S.C., Gerritsen H. Cleasby, I.R. Patrick, S.C, Ewan, D.W, Bearhop, S. (2014) Net gains: Seabird movement reveals the ecological footprint of fishing vessels *Current Biology*, 24 (11).

Data on foraging distances for seabirds was found in:

Grecian J, Witt MJ, Attrill M. J. Bearhop S, Godley BJ, Grémillet D, Hamer K.C, Votier S.C (2012). *Biological Conservation*. A novel projection technique to identify important at-sea areas for seabird conservation: An example using Northern gannets breeding in the North East Atlantic W.

Thaxter C. B., Lascelles, B., Sugar K, Cook A. S.C.P., Roos S, Bolton M., Langston R. H.W., Burton N. H.K. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation* 156. 53–61

The conservation status of breeding seabirds was found in:

Colhoun, K. & Cummins, S. (2013) Birds of conservation concern in Ireland 2014-2019. *Irish Birds* 9 (4): 523-544.

BirdLife International (2017) *European birds of conservation concern: populations, trends and national responsibilities* Cambridge, UK: BirdLife International.

Information on other activities (including commercial fishing, recreational activity and seaweed harvesting) was obtained primarily from the Technical Advisors Interim Report and the Appropriate Assessment of Aquaculture and Fisheries Risk Assessment in Kenmare River SAC (Marine Institute 2019) supplemented by desktop research, a site visit and consultation.

3.3 SCI species assessment

The SCI species were assessed following:

- A review of the reports prepared by Gittings, 2018 and Crowe, 2019 which identified potential impacts on SCI species and connected SPA's.
- Literature relating to impacts was reviewed and the result of this are presented in Table 6.4 and in Appendix 1.
- Collation and presentation of breeding bird data for the connected SPA's and nationally
- Consideration of the ecology of the SCI species.
- Evaluation of the impacts of the identified activities and likely interactions with SCI species

The significance of an impact on each SCI species and their connected SPA (and associated conservation objectives) was then assessed.

3.4 Assessment methodology

The process of AA entails a number of stages commencing with AA Screening (Stage I). Depending on the outcome of Stage I, a Stage II Natura Impact Statement may be required in order to inform Appropriate Assessment where screening identified risks, uncertainty or lacunae (gaps in knowledge) in relation to potential to cause impacts, ecology or status of SCI's, or possible source-pathway-target vectors. Once Stage II is completed an Appropriate Assessment can be carried out whereby the findings of Stage I and Stage II are validated by conducting a thorough review and detailed analysis and appraisal of the evidence. Once AA is complete a Competent Authority can make a determination and may issue a Concluding Statement.

In relation to the proposed Shot Head farm, stages in the AA process to date have been reviewed and the outcomes summarised below.

Assessing potential impact on wild birds

Report by technical expert Dr Tom Gittings

On foot of recommendations emanating from the Oral Hearing in relation to the appeals against the Ministerial decision to grant aquaculture and foreshore licences in respect of the Shot Head proposal, ALAB commissioned a series of detailed technical and ecological studies in relation to the proposed salmon farm. In relation to the potential for the farm to give rise to adverse impacts on adjacent SPA's and their respective SCI's, a desk top study was commissioned in order to provide expert advice on possible requirement for an Appropriate Assessment under the terms of the Habitats Directive.

Terms of reference for the bird's study were to carry out:

- *Review of the designated SPA's 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;*
- *Assess the vulnerability of the species of interest, for which each identified site is designated, to salmon aquaculture activity at Shot Head,*
- *Evaluate 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.*
- *Evaluate 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.*

The resulting report, submitted in February 2018 (Gittings, 2018), addressed the specific requirements of the brief and determined that the EIS and EIA were inadequate in relation to consideration of potential impacts on birds and that, therefore, AA screening was required.

The report discounts the possibility of impacts on a range of SCI species including Chough, Peregrine, Lesser Black backed gull, Storm Petrel, Fulmar and Puffin related to the proposed Shot Head farm. However, the report determined that due to the potential for the project to cause an increase in the mortality of breeding Gannets (an SCI for a number of connected SPA's) through entanglement related events, a Stage II Natura Impact Statement and Appropriate Assessment may be required.

AA Stage I - AA Screening

AA Screening by Dr Olivia Crowe

Following on from the recommendations of Gittings (2018), ALAB commissioned a Screening Stage Assessment Report for the proposed development at Shot Head in Bantry Bay, Co. Cork specifically to determine whether the proposed farm presents a risk of adverse impacts to the SCI's of SPA's that have ecological connectivity with Bantry Bay. The Screening Stage Assessment Report was completed in April 2018 (Crowe, 2018). Based on proximity to the proposed development at Shot Head, seven SPAs were identified for consideration in the screening assessment:

- Sheep's Head to Toe Head SPA 004156
- Beara Peninsula SPA 004155
- Iveragh Peninsula SPA 004154
- Deenish Island and Scariff Island SPA 004175
- The Bull and The Cow Rocks SPA 004066
- Puffin Island SPA 004003
- Skelligs SPA 004007

The Sheep's Head to Toe Head SPA and Beara Peninsula SPA sites were included on the basis of their geographical proximity to the proposed salmon farm, in accordance with published guidelines. Remaining sites were included in the screening on the basis of ecological connectivity with the proposed salmon farm site through the potential use of Bantry Bay as foraging area by some SCI species.

Across the designated sites, a range of SCI's were identified on the basis that they are an SCI within either Beara Peninsula and/or Sheep's Head to Toe Head SPA's or if not an SCI within either of these sites, that the known foraging ranges of the species could lead to potential overlap with the Shot Head site and/or the adjacent sea area.

The list of SCI's identified across all seven sites included in the screening comprised the following species:

- Chough *Pyrhocorax pyrrhocorax*
- Peregrine *Falco peregrine*
- Storm petrel *Hydrobates pelagicus*
- Puffin *Fratercula arctica*
- Lesser Black-backed gulls *Larus fuscus*

- Gannet *Morus pelagicus*
- Guillemot *Uria aalge*
- Fulmar *Fulmarus glacialis*
- Manx shearwater *Puffinus puffinus*
- Kittiwake *Rissa tridactyla*
- Razorbill *Alca torda*
- Arctic tern *Sterna paradisaea*

Further evaluation determined that Chough and Peregrine SCI's are predominantly terrestrial species and would not associate with a fish farm. The screening report also considered that while Storm petrel and Puffin could potentially overlap with the proposed salmon farm based on known foraging ranges, this was unlikely to occur. Furthermore, while Lesser Black-backed gulls could potentially overlap with the proposed site, they are unlikely to be adversely affected by the development. Arctic tern, Razorbill Kittiwake and Manx shearwater were not deemed capable of occurring within the vicinity of the proposed development (based on known foraging ranges).

In relation to Gannet, Fulmar and Guillemot, considering the available information and in reviewing the nearby SPAs and their SCIs, the screening report determined that it was not possible to rule out potential adverse impacts of the proposed development at Shot Head on Fulmar SCI for Beara Peninsula SPA, Iveragh Peninsula SPA, Deenish Island and Scariff Island SPA; Gannet SCI for The Bull and The Cow Rocks SPA and Skelligs SPA; and Guillemot SCI for Iveragh Peninsula SPA. Therefore, it was recommended that the assessment progress to a Stage 2 Natura Impact Statement. The potential impacts on SCI species identified were: Loss of foraging habitat, disturbance and entanglement.

[AA Screening Matrix, Marine Institute \(2019\)](#)

AA Screening matrices have been developed by the Marine Institute for all major aquaculture areas in Ireland. The matrices are used as a decision support tool when DAFM are evaluating new aquaculture license applications as well as applications for renewal of existing licenses. The Marine Institute issued an updated AA Screening Matrix for aquaculture activities in Outer Bantry Bay during March 2019 (Marine Institute, 2019) (Appendix 2). The screening matrix assesses aquaculture activity for 25 licensed sites including algae, oysters, clams, urchins, mussels and finfish in the context of SCI's for nearby designated SPA's and SAC's. The activities considered occupy approx. 547 ha. in total, representing approximately 1.2% of the surface area of Bantry Bay.

Designated sites considered on the basis of being connected to Bantry Bay site are:

- Sheeps Head to Toe Head SPA (Site Code: 004156)
- Beara Peninsula SPA (Site Code: 004155)
- Glengarriff Harbour and Woodland SAC (Site Code 00090)
- Sheep's Head SAC (Site code: 000102)

The screening determines that *“There are no direct or indirect impacts from the culture operations on any of the SACs or SPAs adjacent to outer Bantry Bay”*.

In the context of Disturbance to key species, the screening determines that *“there is no evidence in the scientific literature to suggest that aquaculture activities impact on seal species (feature of Glengarriff Harbour and Woodlands SAC) and the bird species listed in the SPAs, i.e., Chough, Fulmar and Peregrine. Furthermore, any impacts on habitats are likely to be local and not extend beyond the footprint of the activities. Therefore, they are not likely to impact on any of the adjacent SACs”*.

A **Findings of No Significant Effects** statement determines that *“the cultivation of shellfish, finfish and macroalgae in outer Bantry Bay is not likely to affect the features of adjoining Natura 2000 sites”* The statement is made on the basis that there is no spatial overlap of the aquaculture activities with designated sites and the activities do not interfere with key relationships that define the function of the sites. The culture activities are assessed as not leading to habitat loss and will not give rise to significant disturbance to key species. No habitat or species fragmentation is considered to result from the existing and proposed aquaculture activity and no direct discharge of pollutants into the environment will occur. Water quality will not be affected. Overall conclusions are that the culture of shellfish and finfish, as it is currently constituted and proposed, in Bantry Bay does not pose significant risk to the conservation features (SCI's) of the adjacent sites and as such existing and proposed aquaculture activity does not require a full appropriate assessment.

Whilst the screening matrix considers the potential for impacts on the qualifying interests of SPA designated sites within close proximity to the proposed Shot Head site i.e. Sheep's Head to Toe Head SPA and Beara Peninsula SPA; the screening does not consider the potential for impacts on SCI's of more distant SPA's which are considered to be connected to Bantry Bay on account of likely foraging ranges for specified SCI species. Accordingly, of the seven SPA sites considered relevant in the context of the AA process, only two sites that are directly connected to Bantry Bay because sections of their respective boundaries coincide with the shoreline of Bantry Bay are considered in the matrix and the potential for impacts to SCI's of more distant sites is not evaluated.

It is noted that the AA screening matrix does not account for effects of aquaculture activities at inner Bantry Bay. There is extensive suspended mussel cultivation activity in the area to the east of Whiddy Island and in Glengarriff Harbour, where oysters are also under cultivation.

As per legislative requirements, in the event that further projects or developments that have potential to impact on connected designated sites are considered for consent in Bantry Bay, AA screening should be revised to fully account for direct and/or in-combination effects.

AA Stage II - Natura Impact Statement

During 2019, in response to the conclusions and recommendations contained in Gittings (2018) and the Screening Stage Assessment Report provided by Crowe (2018), ALAB instructed the applicant to prepare a Natura Impact Statement (NIS) in relation to the proposed development at Shot Head.

The aforementioned assessments (Gittings 2018; Crowe 2018) concluded, with some variation, that there was potential for the proposed Shot Head farm to impact adversely on SCI species (Gannet; Gannet/Fulmar/Guillemot) for a number of connected SPA's and that it was not possible, on the basis of the evidence considered, to rule out or to quantify any potential adverse impacts.

The applicant responded with a NIS in July 2020 (Watermark Aqua-Environmental, 2020). According to relevant guidelines for AA and the terms of reference for the study, the scope of the NIS was limited to the SCI's that did not screen out during the AA Stage I screening of the proposed Shot Head salmon farm development.

The NIS has been reviewed as part of this assessment. The NIS considers the potential of the project to impact on the conservation objectives for fulmar, gannet and guillemot, where one or more of these species are present in all six identified SPA sites that are considered to be connected to the Shot Head site, on the basis that they may use the site or adjacent sea areas during foraging activity. In this regard it is noted that the Figures and Table presented in the NIS frequently appear to indicate that seven SPA sites are included in the scope of the NIS. While this could cause confusion, the NIS is clear in so far as the narrative refers to the five sites that were identified in the AA screening as hosting SCI species that could be at risk, while Puffin Island SPA has been added to the list, presumably due to the presence of a breeding fulmar population. It appears that the Sheep's Head to Toe Head SPA site is not included in the scope of the NIS as the SCI interests for that site (Chough, Peregrine) were considered to not be at risk and were screened out at Stage 1 (the AA Screening process).

The NIS presents a detailed summary of knowledge with respect to: biology and distribution, feeding, foraging and scavenging behaviour, breeding and population status and the protected status of Gannet, Fulmar and Guillemot populations in Ireland, with reference also to their population status and trends throughout their respective ranges. Particular emphasis is given over to the status and trends of populations in Ireland and the southwestern populations associated with six SPA's in the area surrounding Bantry Bay. The individual species accounts are supported by relevant data in relation to distribution, population status and population trends for SCI species.

Section 2 of the NIS individually investigates the proximity of the colonies and foraging ranges for the three SCI species, to the densest assemblages of marine cage aquaculture activity in Europe (Scottish west coast and Norway) and refers to the status and trends of SCI populations that can be considered connected to the aquaculture sites, by virtue of their foraging ranges. The specific (generic) conservation Objectives for each designated site are stated at Section 2.7.

Section 3 reviews present levels of knowledge relating to the distribution, status and life histories of the three species concerned and assesses the likely scale of impacts from the development of the Shot Head site on the conservation objectives for relevant species. Section 4 reviews the relationships between the subject seabirds and the Shot Head site in isolation and in combination with other aquaculture activity in Bantry Bay as a whole. In this context, subject species foraging ranges, potential connectivity to Bantry Bay aquaculture sites and confirmation of degree of obstruction to foraging are considered, analysed and evaluated. The document also describes and reviews the relative impact potential to seabirds of finfish pen and longline shellfish installations in Bantry Bay, including spatial impacts, attraction and predation effects, effects of artificial lighting and disturbance effects. Mitigation measures are addressed at a number of points in the document.

Potential mitigations used in fin fish aquaculture to eliminate or minimise the scale and/or frequency of occurrence of a range of potential sources of impacts are described. These can include:

- Fish fed pelletized food (preferable to whole fish).
- Sub-surface, slow release feeders.
- Feed rate controlled to reduce feed waste drift from the pens.
- Current speeds not sufficient to allow lateral export of feed through the pen meshes.
- Dead fish removed from nets.
- Appropriate bird netting mesh size covering entire pen.
- Regular net checks and maintenance.
- Bird net maintenance including correct net tension.
- Use of visual bird deterrents (model hawks/owls).
- Design of railings, floats, net rings to reduce roosting sites.

With the exception of the use of visual bird deterrent, the NIS explains that the mitigations described are employed as standard practice across all marine sites operated in Ireland by the applicant. In this context it is understood that the described mitigations will be employed at the proposed Shot Head site also.

At Stage 2 (NIS), the impact of a project or plan alone and in combination with other projects or plans on the integrity of the Natura 2000 site is considered with respect to the conservation objectives of the site and to its structure and function.

While specifically considering potential for cumulative (in-combination) effects associated with the overall aquaculture industry in Bantry Bay, the findings of which concur with the Marine Institute's AA screening referred to previously, the NIS does not identify any other potential sources of impact that have potential to give rise to in-combination effects and which might amplify any effects associated with the operation of the Shot Head site. This appears to be in accordance with the Marine Institute's own AA screening matrix does not consider that in-combination impacts from any activity other than aquaculture could arise and affect any of the identified site's conservation objectives.

To illustrate this point, page 58 of the NIS states *"As required under the Habitats Directive and SI 477 2011, this NIS must consider the potential for impacts on the subject seabird species that could arise from*

the presence of the proposed Shot Head installation, both in isolation, and in combination with other potential impactors in the locality. In order to satisfy this requirement, it is necessary to consider the extent and types of aquaculture in Bantry Bay, other than Shot Head, which have the potential to contribute to cumulative impact. It is submitted that there are no other fixed, potential, local impact sources that need to be taken into account”.

Section 5 discusses the findings of the NIS and presents concluding commentary. It is noted that while there is considerable data available in relation to the population status and trends for the SCI species as well as for a broad range of impact sources, there is a stark shortage of information in relation to the nature and scale of interactions with marine cage aquaculture and associated potential impacts. In this regard, the NIS notes that *“whilst apparently all other classes of impacts on seabirds are extensively and deeply considered and reported upon in the scientific, government, professional / consultancy, NGO, environmental and anti-group lobbyist literature, there is a contrasting dearth of scientific and referenced information on the spatial and disturbance impacts of both finfish and longline marine farming systems on seabirds”*. Furthermore, it is pointed out that what information is available in relation to interactions of seabirds with marine fish farms is quite old and mostly based on outdated production practices and technologies.

In the absence of substantial documentary evidence to support an understanding of interactions between seabirds and cage aquaculture, the NIS makes inference as to the likely overall outcomes for SCI seabird populations in the Beara hinterland, based on outcomes for populations of all three SCI species that are located close to the Scottish and Norwegian cage aquaculture industries. The Scottish and Norwegian marine finfish aquaculture sector is many orders of magnitude larger than the Irish in terms of production tonnage and number and distribution of aquaculture sites and the NIS states that *“there is little difference in the status of colonies or foraging densities for all three species between those close to dense aquaculture activity and those far removed from it. As a prime example, all gannet colonies globally and their global population has grown continually for at least six decades”*.

In terms of the status of seabird populations in Ireland, while the most recent data from the Sea Monitoring Project (SMP) of 2014-15 is yet to be published and the majority of the data is not yet available, the NIS also notes that *“recent data for all subject three species that has been made available under a data request to NPWS shows that the national Irish populations of Northern Gannet, Common Guillemot and Northern Fulmar have increased since the last survey, Seabird 2000”*.

Overall it is concluded that the NIS provides a sufficiently deep analysis and evaluation of risks to the conservation objectives for named SPA’s associated with the proposed Shot Head development. The NIS reaches objective and clear conclusions in relation to risks to achieving and maintaining the generic conservation objectives for each SPA site based on consideration of scientific and/or empirical evidence in relation to SCI ecology and biology, marine cage aquaculture and potential direct and indirect impacts of marine aquaculture on seabirds. The NIS recognises the deficit of data with respect to actual levels of interaction of marine cage farming on SCI species and notes that much of the evidence that is available concerning direct impacts e.g. seabed mortality, is more than 30 years old and relates to a period since when husbandry practices and farming technologies have changed dramatically. When standard

mitigations operated by modern salmon farming enterprises are combined with modern husbandry practices and farming technologies, the NIS concludes that impacts on seabird species have been minimised and are at a level where they do not impact SCI populations as demonstrated by the population status and trends for SCI species in Ireland and in the region of the proposed Shot Head farm in particular.

4. Designated sites and Conservation Objectives

While the proposed development will not be located within any site designated under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I 422 of 2011), a number of designated sites are located in the hinterland as well as within adjoining marine areas, including both SAC's and SPA's. As per terms of reference, the present assessment does not consider impacts on nearby SAC designated sites and is restricted in its scope to validating the findings of previous AA screening and Natura Impact Statement studies that have been completed in respect of the proposed salmon farm's potential to impact SCI's within the SPA network.

Connected Natura 2000 sites and SCI species

Although Bantry Bay is not designated in itself, a number of SPA sites are considered to be connected to the proposed development in that Bantry Bay provides a common foraging area for SCI's. In this context, the foraging range of Gannet, Fulmar and Guillemot with breeding populations within six SPA's (Bull and Cow Rocks, Skellig, Beara Peninsula, Deenish Island and Scariff Island, Iveragh Peninsula, Puffin Island) includes the open coastal waters of Bantry Bay. Gannet, Fulmar and Guillemot are SCI species within at least one of the five SPA's. Fulmar breeding sites are also present along the northern shore of Bantry Bay within Beara Peninsula SPA.

The proposed salmon farm is not located within a Natura 2000 site (SAC or SPA). The Technical Report (Gittings, 2018) and the Screening Stage Assessment Report (Crowe, 2018) identified a number of SPAs which are connected to the proposed fish farm site. SPA connectivity arises where a Special Conservation Interest species (SCI) in an SPA uses an area outside of the SPA for foraging or other activities. Impacts on these connected habitats (foraging areas) may therefore have impacts on the SPA (e.g. poor foraging affecting breeding success and leading to population decline within the SPA). Gittings and Crowe identified five connected SPA's (Table 4.1; Figure 4.1) and three SCI species which could potentially be affected by the proposed salmon farm: Northern Gannet *Morus bassanus*, Northern Fulmar *Fulmarus glacialis* and Common Guillemot *Uria aalge*. Foraging ranges for connected SCI species, hereinafter referred to as Gannet, Fulmar and Guillemot are presented in Table 4.2.

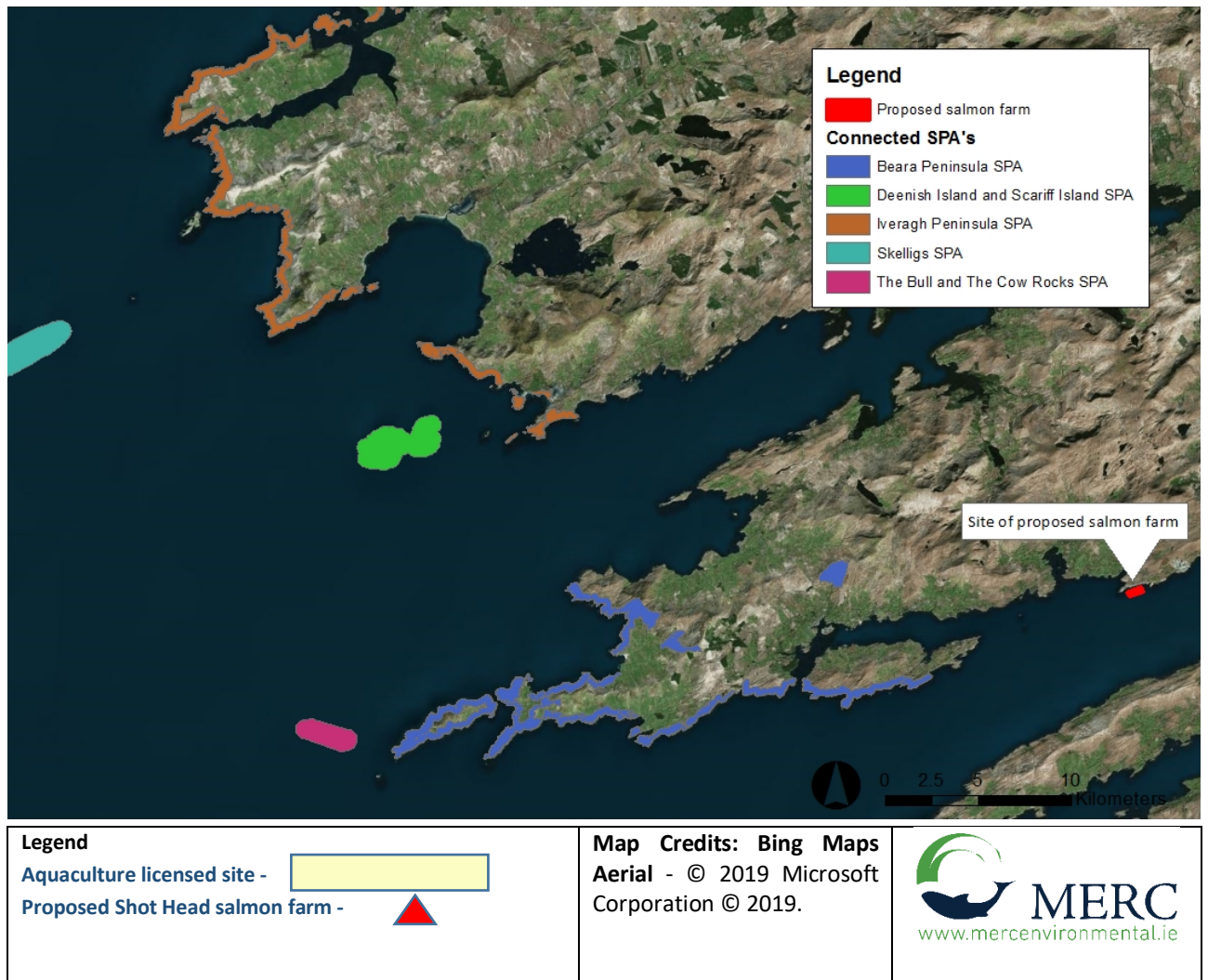


Figure 4.1: Connected SPA’s and the location of the proposed salmon farm in Bantry Bay according to Gittings (2018) and Crowe (2019).

Table 4.2: Connected SPA’s and qualifying species identified by Gittings (2018) and Crowe (2019). And reason for connection to the proposed salmon farm.

SPA	SCI	Connection
Bull and Cow Rocks	Gannet	Bull Rock is c.45 km from the site. The foraging range of Gannets from Bull Rock is 60.9km ² . This foraging range overlaps with Bantry Bay and the site of the proposed salmon farm.
Skelligs	Gannet	Little Skellig is 60km from site. Gannet foraging range is 99km from Skellig. Overlap in foraging range with the proposed salmon farm
Beara Peninsula	Fulmar	Breed throughout Beara peninsula, and along northern side of Bantry Bay. Proposed salmon farm is within their core foraging range and 12km from the SPA (see table 2).
Deenish Island and Scariff Island	Fulmar	61 km from site. Overlap in foraging range (see Table 2) with the proposed salmon farm
Iveragh Peninsula	Fulmar	64 km from site. Overlap in foraging range (See Table 2)with the proposed salmon farm
	Guillemot	64 km from site. Overlap in foraging range (see table 2 with the proposed salmon farm

1. Grecian *et al*, 2012

Table 4.3. Foraging ranges for connected SCI species following Grecian et al (2012). Note specific foraging ranges for Gannet from Bull Rock and Skelligs are available (Table 1).

Species	Foraging range (km)
Gannet	229.4 ± 124.3 mean max 92.5 ± 59.9 mean Highest confidence in assessment
Fulmar	400 ± 245.8 mean max 47.5 ± 1 + 9 + 7.7 mean Moderate confidence in assessment
Guillemot	84.2 ± 50.1 mean max. 37.8 ± 32.3 mean Highest confidence in assessment

In summary, the foraging range of Gannet, Fulmar and Guillemot with breeding populations within five SPA's (Bull and Cow Rocks, Little Skellig, Beara Peninsula, Deenish Island and Scariff Island, Iveragh Peninsula) includes the open coastal waters of Bantry Bay. Gannet, Fulmar and Guillemot are Special Conservation Interest species within at least one of the five SPA's. The proposed salmon farm development may affect foraging Gannet, Fulmar and/or Guillemot with implications for the conservation objectives of five connected SPA's. Fulmar breeding sites are present along the northern shore of Bantry Bay. The proposed salmon farm development may interact with the breeding sites of this SCI with implications for the conservation objectives of the Beara Peninsula SPA.

Conservation objectives for connected SPA sites

A generic conservation objective is available for the connected SPA sites (NPWS, 2019; NPWS, 2018). The generic conservation objective is:

- *To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA*

No further or more specific conservation interests have been published in relation to any of the SPA sites connected to Bantry Bay. However, as part of this assessment a review was carried out to identify further possible conservation objectives that could reasonably be applied to the SCI sites in order to demonstrate more thorough and effective application of the **precautionary principle** (a specific requirement referred to in NPWS Guidance² when carrying out AA). The review determined that specific conservation objectives are available for the Great Saltee Islands (NPWS, 2011) and these relate to the same SCI species relevant to this assessment. Accordingly, it is considered appropriate to apply these in the context of the present assessment. The specific conservation objectives are listed in Table 4.3.

²

Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. NPWS 2010. [NPWS Guidelines for AA](#)

Table 4.4: Specific conservation objectives for connected SPA species (adapted from Great Saltee Islands SPA, 2011)

Attribute	Measure	Target
Breeding population abundance: apparently occupied sites (AOSs)	Number	No significant decline
Productivity rate	Mean number	No significant decline
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline
Prey biomass available	Kilogrammes	No significant decline
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
Disturbance at the breeding site	Level of impact	No significant increase
Disturbance at marine areas immediately adjacent to the colony	Level of impact	No significant increase

5. Status and distribution of SCI species

5.1 Use of Bantry Bay by Fulmar, Guillemot and Gannet

Surveys by Roycroft *et al*, 2007

Roycroft *et al*, (2007) completed surveys of the inshore waters of Bantry Bay. Roycroft describes that other studies of seabird distribution (Pollock, 1994, Pollock *et al*, 1997 and Mackey *et al* 2004; cited in Roycroft *et al*, 2007) have been carried out on relatively large scales with a focus on offshore areas and have indicated that the inshore zone holds a high diversity of seabird species and higher abundances than continental slope or oceanic waters. The objective of the 2007 study was to identify significant determinants of seabird distribution in Bantry bay using physical habitat characteristics. Boat based and land based surveys were completed. Roycroft notes that the Dursey Island in the outer bay holds >500 pairs of Fulmar and the bay is also likely to be utilised by foraging gannet from Bull and Cow Rocks.

Transect surveys (Figure 5.1) were completed between July 2001 and September 2002 and then again between June 2003 and September 2003. Monthly or bi-monthly surveys were completed using standard at-sea survey methods. A review of Roycroft *et al.*, 2007 found the following results relevant to this assessment:

- Maximum species richness was randomly distributed throughout Bantry bay with a clustering of higher values along the northern side of the Bay and near the Bay mouth.
- Highest mean seabird densities occurred in the outer half of Bantry Bay in the summer months. In the winter seabird densities was distributed in a more random fashion with a small clustering of high densities in the inner bay.
- Guillemots in Bantry Bay showed highest mean densities (10-60/km²) in the outer half of the Bay in areas with relatively high distance from the coast.
- Guillemots were recorded at higher densities away from the coastline. It was observed that these species may be wary of foraging close to land due to the presence of predators or human activity. Guillemots were recorded in lower numbers in the inner bay. Guillemots out-numbered Razorbills. Roycroft, considered that this is likely to be due to the larger number of Guillemots breeding on the nearby Bull and Cow rocks.
- All fulmars recorded on transect during the surveys were observed in flight (rather than on the water and potentially foraging) and were distributed mainly in the outer regions of Bantry Bay and along its northern side.
- 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. Overall mean density was 0.16/km².
- Seabirds including Gannet and Fulmar occurred in relatively low numbers in Bantry Bay and were restricted to its outer regions. These species are more typically offshore in distribution. Roycroft *et al*, discusses that Gannets and Fulmar which breed within 20km of Bantry Bay (Bull and Cow Rocks SPA and Dursey Island) but did not regularly forage within the Bay. It is considered by Roycroft *et al* likely therefore, that the prey of these species is more abundant in offshore waters.

- The outer bay was identified as a hotspot for seabird distribution in summer. In winter the inner Bay is of more importance to seabirds.

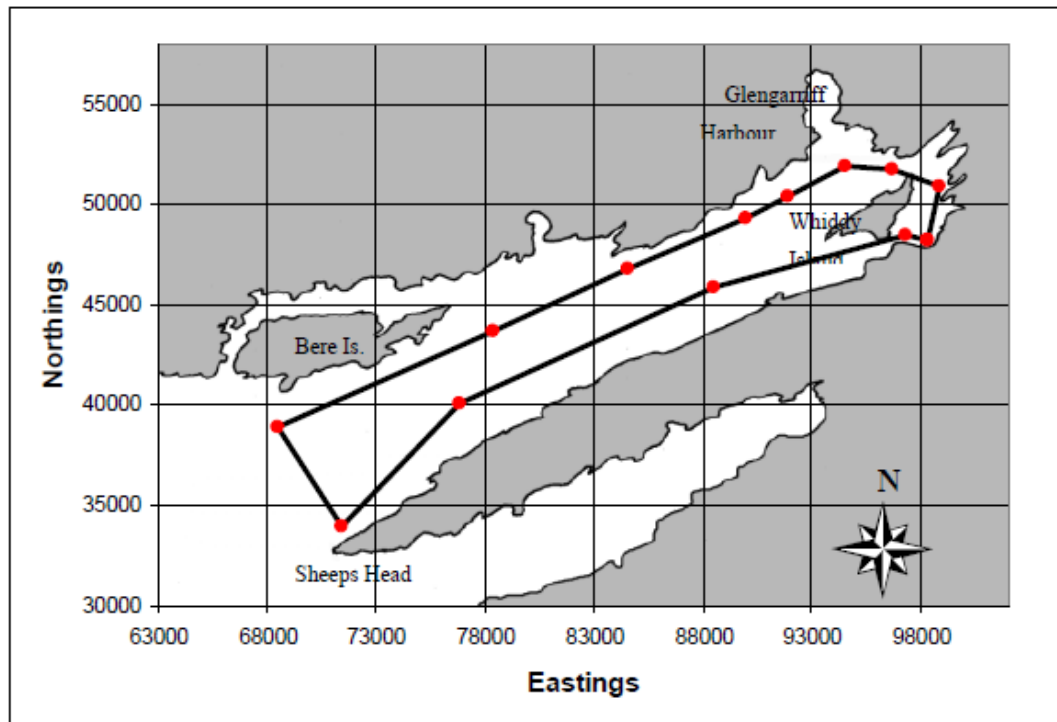


Figure 5.1. Extracted From Roycroft *et al.* (2007). The transect route used in Bantry Bay showing the waypoints used to navigate boat surveys (red dots) and the transect lines (black).

Shore based observations were carried out between June 2001 and February 2004. Six locations were used one of which was in inner Bantry Bay (c. half way down Bantry Bay across from Ardigole harbour), the rest were headlands (Sheep's Head, Black Ball Head, Dursey Island, Three Castle Head and Mizen Head) (Figure 5.2).

- Alcidae (auks: Common Guillemot, Razorbill, Black Guillemot) formed a much larger proportion of the species assemblage in the inner Bantry Bay and Sheeps Head sites, Gannets formed a large percentage of the overall assemblage (17-60%) of the outer sites, but only 6 to 9% of the species at the Inner Bantry bay and Sheeps Head sites.
- The inner Bantry Bay site recorded the lowest numbers of seabirds with a mean of 149 birds per scan with Alcidae being the most abundant species.
- However species richness was high at the inner Bantry Bay site. Indicating that this region is of high importance to a wide range of seabirds; both neritic (typically associated with shallow coastal waters) and pelagic (typically associated with deep offshore waters).

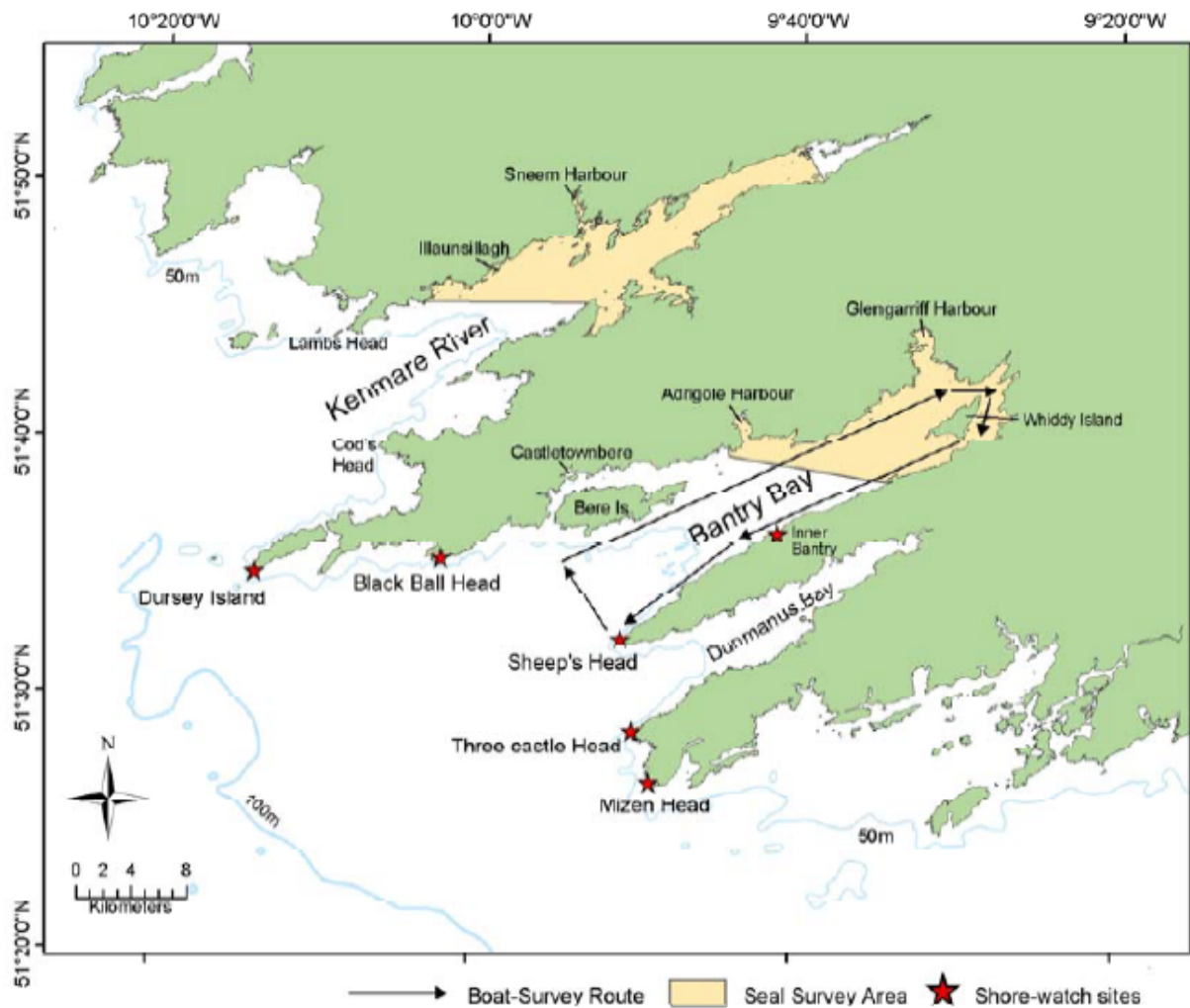


Figure 5.2. Extracted from Roycroft *et al.*, 2007, to show location of shore watch locations (red stars) including one in Inner Bantry Bay.

Tracking data from Bull and Cow Rock Gannet colony

Bodey *et al* (2014) tracked 14 gannets from Bull and Cow Rocks using data loggers. This data can be viewed online³ and shows that tracked Gannets from the Bull and Cow Rocks SPA, used Bantry Bay. The results from these surveys are limited by sample size, however they clearly link some Gannet activity in Bantry Bay with the Bull and Cow rock breeding population. This would be expected given proximity of the SPA, the open waters of Bantry Bay and the known foraging range of Gannet

National Biodiversity Data Centre data⁴

The National Biodiversity Data Centre (NBDC) provides records which show breeding Fulmar were recorded in the area of Shot Head (specific locations not provided; precision at 2km square level) during the 2007-11 breeding bird atlas survey. Other records, both breeding and non-breeding, are presented for Bere Island and along the northern shore of Bantry Bay and for the open waters of Bantry Bay. Most records are concentrated in the outer two thirds of the Bay. The NBDC provides records for Gannets throughout Bantry Bay. Most are concentrated in the outer two thirds of the Bay but they also show use

³ http://www.seabirdtracking.org/mapper/?dataset_id=720

⁴ <https://maps.biodiversityireland.ie/Map/Marine/Species>

of the inner reaches of the Bay. Gannets do not breed in Bantry Bay and these are records of birds using the bay for foraging. The NBDC presents records which show Common Guillemot use throughout Bantry Bay. These are not breeding birds but foraging birds.

In summary, surveys by Roycroft *et al.*, 2007 included both boat based transects and land based watches using standard survey methods. These surveys provide data on species richness, density and seabird distribution in Bantry Bay. While surveys were completed between 2001 and 2004 similar patterns of distribution are considered likely to occur today. Seabirds were recorded in low densities throughout Bantry Bay, with highest densities in the outer bay. The inner bay supported a higher diversity of species, with the occurrence of both inshore and offshore species. Tracking data shows that tagged Gannets from the Bull Rock used Bantry Bay for foraging, providing a clear connection between this SPA and the Bay. Other records (NBDC) for Bantry Bay show its use by Fulmar (including breeding), Guillemot and Gannet (both non breeding).

5.2 Ecology of Special Conservation Interest species

Gannet, Fulmar and Guillemot nest on coastal cliff and island sites around Ireland. They are pelagic species which feed largely in offshore waters but will also forage in coastal waters. They are vulnerable to predation and human disturbance at their nest sites. As with most seabirds they are long lived, with low reproductive output. Populations are thus slow to recover from adult mortality

Gannet

The gannet is a large-bodied, long-lived seabird that nests on isolated islands and cliffs. As with most seabirds, populations are sensitive to adult mortality and have low reproductive output (Furness *et al.*, 2013). This leads to low inherent population growth rates and a generally poor ability to recover from factors which reduce populations, particularly if these result from additional adult mortality (Furness *et al.*, 2013). Gannets require isolated nesting islands or cliffs to prevent disturbance from ground-based predators and humans, within commuting distance of an adequate prey base for provisioning chicks. Gannets are opportunistic, generalist predators. Their diet is primarily shoaling pelagic fish including mackerel, herring and gagoids, however they exploit a range of other prey species as well as fisheries discards (McLuskie *et al.*, 2012). Gannet mean max. foraging ranges were estimated to be 229.4 (+/- 124.3km) by Thaxter *et al.*, 2012, however Grecian *et al.* (2012) provides specific foraging ranges for Gannets from the Bull Rock and from Skellig Rocks of 45km and 60 km respectively. Foraging ranges usually increase with colony size. Following the breeding season, gannets range widely in pursuit of prey, primarily into offshore areas. Gannets are plunge-diving seabirds, meaning that they dive rapidly from heights of around 10-30m, entering the water at high speeds and sometimes descending to depths of 10m-20m in pursuit of prey.

Fulmar

Fulmar are part of the tubenose family of seabirds and use both scent and sight to help locate prey items. Scent is particularly important for night-time foraging. Fulmars forage primarily on pelagic prey including amphipods, copepods, squid and sand eels, though will also readily take fisheries discards (McLuskie *et*

al, 2012; Cummins *et al*, 2019). Prey are obtained primarily through surface feeding and occasionally through shallow plunge-dives. As fulmars nest on the ground, they are vulnerable to land-based predators and usually nest on offshore islands and inaccessible cliff faces. Fulmars feed chicks on concentrated stomach oil derived from semi-digested prey. This allows fulmar to range more widely from their colonies while provisioning, covering ranges up to 664km (Thaxter *et al*, 2012), though this varies both with colony and seasonal oceanic conditions. As with other seabirds, fulmars are long-lived and their populations are particularly sensitive to adult mortality (Furness *et al*, 2013).

Guillemot

Guillemots swim underwater in pursuit of prey and feed primarily on small pelagic schooling fish (Mitchell *et al*, 2004). Guillemots feed mainly offshore and are numerous around Ireland, with most adults remaining within a few hundred kilometres of their colonies year round (Mitchell *et al*, 2004). Guillemots are gregarious and nest in colonies at numerous island and cliff sites around Ireland (Cummins *et al*, 2019). Birds will flush from colonies if overly disturbed by humans, which can result in loss of eggs and chicks. Guillemots feed chicks on whole fish delivered to the chick at the colony. They thus require isolated breeding locations within commuting distance of adequate populations of small schooling fish. Mean foraging distance is c. 40km (Thaxter *et al*, 2012). As Guillemots are long lived, populations are very sensitive to adult mortality (Furness *et al*, 2012).

6. Potential Impacts on SCI species

The Screening Stage Assessment Report (Crowe, 2018) found that the construction and anchoring of the proposed Shot Head salmon farm development and the associated increased boating activity could, during construction and operational stages, potentially impact SCI species and connected SPA's through

- Disturbance causing displacement.
- Loss of foraging habitat
- Entanglement in predation control nets

The NIS also considers a range of potential impact sources including:

- Displacement effects
- Attraction and depredation
- Anthropogenic disruption and disturbance
- Lighting

In the context of validating the findings presented in the previous screening and NIS study in relation to potential sources of impacts, this assessment has conducted an independent review in order to independently appraise predicted effects of the Shot Head farm.

6.1 Disturbance effects

Disturbance can cause seabirds to take flight and become displaced from their foraging and/or breeding areas. As described by Gittings (2018) the magnitude and significance of any disturbance impacts will depend on the level and frequency of 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.

Gittings (2018) identified that boat movements, associated with the proposed fish farm were the most likely source of disturbance to seabirds. Boats will move to and from the fish farm site, along the northern shore of Bantry bay; most frequently (but not exclusively) between Shot Head and Castletownbere. This may cause the displacement of birds in the vicinity of the boat activity and periodic disturbance to foraging activity and short-term exclusion from foraging habitat. Operation of equipment and machinery at the fish farm site may also cause disturbance and potential displacement of seabirds. Boat activity and activity at the site will be tied to working hours and will not be constants. Accordingly, disturbance effects will be tied to activity patterns with extended periods without farm related disturbance at intervals between vessel movements and outside of working hours.

Literature relating to disturbance to seabirds from vessel traffic was considered and key findings are presented in Table 6.4. Based on this review, disturbance effects are not predicted for Fulmar. Low disturbance effects are predicted for Gannet and moderate effects are predicted for Guillemot. Any

disturbance effects are limited to foraging birds as the boat activity does not overlap with a SPA and associated breeding birds. Where foraging birds are displaced this is assessed as habitat loss (see below).

Gannet are considered to be flexible and opportunistic in selection of foraging, therefore displacement and use of other foraging areas in response to disturbance is considered a likely response and mitigates against any possible displacement effects. Guillemot are moderately flexible in habitat use; displacement effects may therefore be greater depending on the availability of alternative foraging habitat.

In summary, it is considered that disturbance (episodic and repetitive, rather than on going/permanent) by boat traffic and activity at the salmon cage site is most likely to affect Guillemot. Flexibility in habitat use and tolerance of boat traffic indicate that Gannet and Fulmar are at low risk of disturbance and/or displacement effects. Cumulative impacts from vessel traffic disturbance are considered below.

Table 6.5: Key findings relating to Fulmar, Gannet and Guillemot with regards to likely responses to vessel traffic disturbance.

Species	Sensitivity
<p>Fulmar</p>	<p>McLuskie <i>et al</i>, 2012 reviewed seabird vulnerability to wave and tidal energy. As part of the review disturbance effects arising from boat traffic were considered. Fulmar was considered to have a high tolerance to disturbance as they are used to exploiting human marine activities.</p> <p>Garthe and Huppopp, 2004 developed a windfarm sensitivity index for seabirds (ranging from 1 to 5). To develop the index a scoring system was used. Fulmar was scored 1 for disturbance by ship and helicopter traffic (where 1 is hardly any escape avoidance behaviour and/or none/very low fleeing distance and 5 is strong escape/avoidance behaviour and/or large fleeing distance) and 1 for flexibility in habitat use (where 1 is very flexible in habitat use and 5 is reliant on specific habitat characteristics).</p> <p>Fliehsback <i>et al.</i>, 2019 completed a study of bird response to ship traffic in coastal and offshore zones of the German North Sea and Baltic Sea. This study found that the lowest proportion of disturbance responses (flushing or escape activity in response to ship traffic) were found in gull species and northern fulmar. This study developed a Disturbance Vulnerability index (DVI) which combined escape distance, wing loading, habitat use flexibility, biogeographic population size, adult survival rate and European threat and conservation status.</p> <p>Fulmar scored 8 on the DVI; the most sensitive species was Red-throated Diver with a DVI of 77.8 and the lowest was Arctic Tern with 3.3.</p>
<p>Gannet</p>	<p>McLuskie <i>et al</i>, 2012 describe Gannet as regular discard feeders Gannet which are not disturbed by shipping traffic. In relation to offshore renewable energy developments, they consider it unclear as to how disturbance would affect gannets, although displacement is considered to be the likely consequence. Cumulative effects of displacement were considered.</p>

	<p>Northern Gannet scored 2 for disturbance by ship and helicopter traffic (ie some escape avoidance behaviour; where 1 is hardly any escape/avoidance behaviour) and 1 for flexibility in habitat use (ie very flexible in habitat use) (Garthe and Huppopp, 2004)</p> <p>Gannet scored 15.6 on the DVI (Fleissbach <i>et al.</i>, 2019); the most sensitive species was Red-throated Diver with a DVI of 77.8 and the lowers was Arctic Tern with 3.3.</p>
Guillemot	<p>McLuskie <i>et al</i>, 2012 describe Guillemot as moderately affected by disturbance from helicopter and boat traffic</p> <p>Guillemot scored 3 for disturbance by ship and helicopter traffic (ie moderate escape avoidance behaviour; where 5 is strong escape/avoidance behaviour and/or large fleeing distance) and 3 for flexibility in habitat use (ie moderate flexibility in habitat use; where 5 is reliant on specific habitat characteristics) (Garthe and Huppopp, 2004).</p> <p>Guillemot scored 19.5 on the DVI (Fleissbach <i>et al.</i>, 2019); the most sensitive species was Red-throated Diver with a DVI of 77.8 and the lowers was Arctic Tern with 3.3.</p>

6.2 Displacement effects - reduction of available foraging habitat

Seabirds forage in a dynamic marine environment (Gaston, 2004) where they prey on moving shoals of fish and other organisms within coastal and offshore waters. Seabirds forage over a wide area as indicated by their foraging range. Concentrations of prey are associated for example with turbulence, and upwellings which may be associated with headlands, bottom topography or strong tidal currents (Gaston, 2004). Hotspot feeding areas associated with upwellings and shelf fronts have been identified by e.g. Cox *et al.*, 2016. Successful foraging is required for winter survival, for fitness during the breeding season and for the rearing of young.

The open waters of Bantry Bay are used by foraging seabirds. Roycroft *et al.* 2007 found that Bantry Bay is used by low densities of seabirds year-round. Surveys found a higher diversity of species in the inner Bay and highest densities of seabirds at the mouth of the Bay. These surveys did not extend along the north shore of Bantry Bay between Bere Island Shot Head.

Salmon cages are floating cages which do not cause a significant permanent loss of foraging habitat. Birds can feed amongst the cages and the cages can also have an aggregating effect for some fish species, which in turn may attract foraging seabirds. The footprint (marked navigation exclusion area) of the proposed Shot Head fish farm site is 42.5 ha. The fish pen array is estimated to occupy something less than <2ha of sea surface area, exclusive of a submerged mooring grid. Additional equipment such as a feed barge and floating feed distribution pipe work will occupy a further estimated 2ha. Loss of potential foraging habitat to Fulmar, Gannet and Guillemot may result from the presence of the fish pen array and other infrastructure and moored structures.

The area of Bantry Bay is estimated varyingly at between 37,000 and 42,000ha, depending on where the outer (seaward) boundary of the site is positioned and whether intertidal areas are taken into account. Using a mean estimate of 40,000ha as representing the area of foraging habitat *potentially available* to

seabirds in Bantry Bay, the proposed fish farm reduces the area of available foraging habitat in Bantry Bay by 0.106%, assuming that seabirds are excluded permanently from the entirety of the proposed licensed 42.5 ha, which will not be the case.

6.3 Entanglement effects

Stocked salmon cages provide a potential feeding resource to seabirds. Predation by piscivorous birds is an issue for salmon growers, which can result in stress to and loss of salmon stock. In response, salmon growers protect their stock by covering the top of fish cages with topnets. Birds may persist in predating fish (e.g. by gaining access through holes or opening in a topnet, but may find themselves unable to escape through the entry point). Birds may then become entangled as a consequence of trying to escape from the net and this may lead to mortality. In terms of SCI species, this potential impact mostly concerns Gannets, which have been known to predate salmon cages particularly in the period immediately after stocking when fish are easily predated. As salmon grow rapidly under culture, the probability of impact in this way diminishes over time as fish quickly reach a size where predation is more difficult and larger penned salmon become less attractive to opportunistically feeding Gannets.

To inform this assessment, a review of this potential impact on piscivorous birds was completed (Appendix II). There has been little consideration of this issue in Ireland, however it has been considered elsewhere. A key focus of this review was Scotland, which is the largest producer of farmed Atlantic salmon in the EU. The salmon farming industry has developed in west coast sea lochs and inshore waters since the late 1970s (Kenyon and Davies, 2018). Scotland also supports 16 Gannet colonies and 58.4% of the NE Atlantic Gannet population with 243,505 AON counted in the 2013-14 survey (Murray et al, 2015). Accordingly, there is ongoing potential for interactions between Gannets and caged salmon. The review of impacts found the following:

- Seabirds predate farmed fish in cages and this has been observed since at least the 1980's. The main predatory species of concern are Cormorant and Heron. Predation by Gannet was recorded at a low number of sites. Discussions regarding predatory species impacts rarely refer to Gannet.
- A survey of Scottish fish farm operators in 2001 identified 12 different predator species. Gannets were reported as a predatory species by <10% of operators (c.<20 out of 195 sites). Mink, Otter, Gulls, Cormorants, Herons, Shags, Grey seals and Harbour seals were all identified at a greater number of sites while Fulmar, small land birds, and Guillemot were recorded at a lower number of sites. Details regarding site location and any mortality incidents were not available.
- A recent review of the environmental impacts of salmon cage culture in Scotland considered entanglement as an emerging environmental concern and pointed to the lack of data regarding this issue.

In summary, this assessment finds that piscivorous seabirds are known to predate penned fish at marine salmon farms. Topnets are used to mitigate against loss of stock. Top nets, where they are not maintained correctly, present an entanglement risk to seabirds (including Gannets) trying to escape from salmon pens accessed through gaps or tears in the top net. Gannets have been recorded as a predatory seabirds at caged salmon farms, however Cormorant, Heron (and seals) are more regularly recorded. There is no evidence that entanglement causing mortality occurs routinely, however data in relation to entanglement related mortality of salmon farms using modern husbandry techniques and farming technology is lacking. While Gannet predation appears to be an occasional event at salmon cages, it does occur and with this there is a risk of mortality owing to entanglement.

6.4 Lighting associated effects

Lighting can be used in salmon aquaculture for a number of husbandry related purposes. Once salmon begin to reach sexual maturity, growth rates diminish and stock must be harvested or the product loses value. Surface lighting of fish cages can be used to manipulate apparent day length and thereby may afford a degree of control over the rate at which stock matures. Lighting was used in this way with varying degrees of success in the past however the need for lighting has diminished due to the availability of genetic stock that have been selected in part on the basis of late maturation characteristics as well as for rapid growth and other desirable attributes. Underwater lighting has been used in the past to stimulate the feeding response in pen reared salmonids however, lights are no longer used in this way.

The only lighting that will be used on the proposed farm is required by law for the purposes of navigational safety. The corners of the proposed farm site will be marked with navigational buoys fitted with flashing yellow lights. Additional individual pen markers will also be deployed (flashing yellow) on individual pens. Navigational markers are standard features in coastal waters used to mark the presence of a wide range of structures including fish farms, sewer outfalls and other possible hazards to navigation. None of the proposed navigational lighting will provide constant light and lighting is intermittent, yellow flashing LED light. Therefore, they are not known to act to attract seabirds in their own right while seabirds may use floating navigation buoys as rafting sites. There is no evidence that lighting presents a collision risk to seabirds that are attracted to floating navigational buoys on which they are located.

Gannet and Guillemot are not normally night feeders or flyers. Fulmar do feed at night, but this generally takes place well offshore. Mussel longline sites are also equipped with navigational lights, under the terms of their licenses. Available evidence supports the likelihood that no material risks to seabirds exists due to the use of lighting on the proposed Shot Head site.

7. Appraisal of the significance of effects

7.1 Effects – direct and indirect impacts on SCI species

In the context of the proposed Shot Head site development, the following section of this assessment reviews and evaluates the effects and predicted direct and/or indirect impacts on SCI species and the conservation objectives for connected SPA’s, as described and assessed in the Screening Stage Assessments and NIS. Evidence from the various studies submitted is appraised in the context of the likely impacts on SCI species.

The appraisal is carried out in the context of the expanded (precautionary) conservation objectives that are adapted from the Great Saltee Islands SPA conservation objectives published by NPWS (Table 7.1). Attributes contained in the expanded conservation objectives that are considered relevant in this assessment as the proposed farm could potentially affect them are:

- Breeding population abundance: apparently occupied sites (AOSs)
- Productivity rate
- Distribution: breeding colonies

Other attributes and targets are not considered further as they are not relevant in the context of the potentially impacting effects that may be associated with the proposed Shot Head salmon farm.

As described, disturbance and loss/reduction of available foraging habitat may reduce foraging success for wintering and/or breeding birds, with implications for breeding success and productivity. The impact of mortality arising from entanglement may also affect breeding success and productivity which in turn could cause long term colony population level effects.

Table 7.1 Attribute and targets associated with the specific conservation objectives for connected SCI species and sites (adapted from Great Saltee Islands SPA, 2011)

Attribute	Measure	Target	Included in AA
Breeding population abundance: apparently occupied sites (AOSs)	Number	No significant decline	YES
Productivity rate	Mean number	No significant decline	YES
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	YES
Prey biomass available	Kilogrammes	No significant decline	NO
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	NO
Disturbance at the breeding site	Level of impact	No significant increase	NO
Disturbance at marine areas immediately adjacent to the colony	Level of impact	No significant increase	NO

Possible impacts on the above conservation objective attributes for each SCI species are considered in detail in the remainder of this section.

7.1.1 Gannet

NIS Assessment: No population level impact will result for Gannet colonies due to the development of the Shot Head salmon farm.

Review of impacts on Gannet colonies

The Gannet is of medium conservation concern in Ireland and is a migratory species under the EU Birds Directive. The Irish and UK Gannet population is increasing and this trend has been apparent for several years. Numbers at the Bull and Cow Rock and Skellig SPA are also increasing, consistent with this wider trend (Table 7.2 and 7.3).

Tracking data has shown that Bantry Bay is part of the foraging range of the Bull and Cow Rock and Skellig SPA Gannet colonies. These colonies are of national importance. Intensive surveys of Bantry Bay by Roycroft *et al.*, 2007 found that while Gannet do use the Bay, densities in the inner Bay where the salmon cages will be located are low with greater densities occurring at the mouth of the Bay.

Gannets are considered to be tolerant of boat traffic and flexible in their use of foraging habitat and there are no published reports or other evidence that suggests significant effects associated with typical levels of inshore boat traffic as is encountered on a daily basis along the coast. Indeed, Gannets are routinely observed foraging in proximity to fishing vessels and close to centres of human population such as within harbours and ports. Accordingly, it is considered highly likely that this species is adaptable and readily habituates to new and changes patterns of human activity and will not be displaced and adversely impacted by the proposed development.

Being opportunistic foragers, Gannets will predate at salmon cages if vulnerabilities in husbandry practices allow them to do so. While data on the level of interaction is lacking (likely due to the fact that effective mitigations are in place that ensure occurrences are minimal), a review of available literature indicates that mortality due to entanglement is likely to occur occasionally. Given the plunge diving behaviour of Gannets and the use of top nets to prevent predation, entanglement causing mortality is an ongoing risk where Gannets predate at salmon cages.

Little evidence has been available to the NIS and consequently this assessment that will substantiate the actual level of mortality related to entanglement on marine fish farms in Ireland. However, it is noted that the applicant organisation operates marine fin fish farm sites at Roancarrig and Ahabeg in Bantry Bay as well as at Inishfarnard and Deenish Island in Kenmare River to the north of Bantry Bay. These sites are all required to monitor and report incidences of mortality of birds and mammals as part of their individual certifications under the Aquaculture Stewardship Council. In this regard they are required to maintain logs of incidents of wildlife mortalities related to the farming operation for each certification. It is noted that in the publicly available certification reports for these sites, the use of wildlife logs to record all events leading to mortality is confirmed for each of the sites, while no actual incidences of bird mortality are

recorded for any of the aforementioned licensed salmon farm sites during recent audits of any of the sites. While not directly verifiable, evidence provided by the log supports the understanding that overall risks are low.

Overall Assessment: The impacts of disturbance and loss of foraging habitat resulting from the construction and operation of the proposed salmon farm at Shot head are considered highly unlikely to have a significant effect on foraging opportunities for the Gannet SCI in Bantry Bay. Significant impacts on breeding success and productivity in connected SPA populations are therefore not considered likely.

Entanglement leading to mortality of Gannet is likely to be an occasional event affecting individual birds. The Gannet population at connected SPA’s has been increasing over the last number of years and this trend is consistent with population trends at other Irish, UK and Norwegian colonies, including at those colonies that are within the foraging range of the extensive marine cage culture industries in those countries. This increasing population trend has continued throughout the period where salmon cages have been in place in Bantry Bay and the adjacent Kenmare River, suggesting that any mortality events at these sites are not currently having an adverse population level impact on the Gannet colonies at connected SPA’s. Given the low likelihood of entanglement within the context of a stable and increasing population, significant effects are considered highly unlikely to occur. However, the Gannet population is not likely to continue to increase (Furness *et al*, 2018) and there are many pressures on seabird populations. Given the lack of data on Gannet predation and entanglement, this interaction requires monitoring. Should the Gannet population decline at the Bull and Cow Rock it will be important to evaluate the effect of this interaction on a declining population. A recommendation is made in this context and is an outcome of this assessment.

Table 7.2: Population and conservation status of Gannet in Ireland and Europe.

National Pop. 2015-2018 ¹	National Trend (Long term)	BOCCI ² Status Ireland	SPEC Status and trend Europe ³	EC Birds Directive
47,946 pairs	Increasing	Amber (Medium concern)	Not listed. Increasing.	Migratory species

1. Cummins *et al*, 2019
2. Colhoun & Cummins, 2013.
3. BirdLife International, 2017

Table 6.3: Connected SPAs and population trends for Gannet at these sites.

Connected SPA’s	SPA pop. ¹	SPA Pop. trend	Connection
Bull and Cow Rocks	1511 AON/S in 1985 1815 AON in 1994 1879 AON in 1999 3694 AON in 2004, 6388 AOS in 2014 ¹	Increasing	Bull Rock is c.45 km from the site. The foraging range of Gannets from Bull Rock is 60.9km. This foraging range overlaps with Bantry Bay.
Little Skellig	22 000 AOS in 1968/70	Increasing	Little Skellig is 60km form site.

	22,500 AOS in 1984/85 26,436 in 1995, 29,683 in 2004 35,294 in 2014/14 ¹		Gannet foraging range is 99km from Skellig. Overlap in foraging range
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1. Newton et al, 2014.

7.1.2 Fulmar

NIS Assessment: No population level impact will result for Fulmar colonies due to the development of the Shot Head salmon farm.

Review of impacts on Fulmar

The Fulmar is of low conservation concern in Ireland and is a migratory species under the EU Birds Directive. The Irish population is increasing, however recent data indicates that this increase may be masking a site level decline (Cummins *et al*, 2019; Table 7.4) and breeding numbers in Europe are in decline. Trend data for connected SPA’s is lacking (Tables 7.4 and 7.5).

Given the location of known breeding sites within Bantry Bay it is likely that those birds which are present in the Bay are part of the Beara Peninsula SPA breeding population. Winter use of the Bay by Fulmar may include birds from other breeding sites. Summer use is likely to include locally breeding birds. Fulmars are considered to be highly tolerant of boat traffic and flexible in their use of foraging habitat.

Surveys of Bantry Bay (Roycroft *et al*, 2007) found that Fulmar use the Bay, however densities are low and most birds were recorded commuting i.e. transiting to/from foraging areas and not using the waters of Bantry Bay for foraging.

Overall Assessment: The impacts of disturbance and loss of foraging habitat resulting from the construction and operation of the proposed salmon farm at Shot head are considered not likely to have a significant effect on foraging Fulmar in Bantry Bay. Significant impacts on breeding success and productivity in connected SPA populations are therefore not considered likely. Based on the literature Fulmar predation at salmon farms is rarely recorded, thus the risk of entanglement and mortality has not been considered.

Table 7.4 Population and conservation status of Fulmar in Ireland and Europe.

National Pop. 2015-2018 ¹	National Trend (Long term)	BOCCI ³ Ireland	Status	SPEC and Europe ⁴	Status trend	EC Birds Directive
32,899 pairs	<i>Increasing</i> but see note below ²	Green (least concern)	(least)	SPEC 3 ⁵	Decreasing	Migratory species

1. Cummins *et al*, 2019

2. Cummins et al, 2019 suggest that increase survey effort may be masking site level declines.

3. Colhoun & Cummins, 2013.

4. BirdLife International, 2017

5. Species of European Conservation Concern not concentrated in Europe

Table 7.5: Connected SPAs and population trends for Fulmar at these sites.

Connected SPA's	SPA pop. ¹	SPA Pop. trend	Connection
Beara Peninsula	575 pairs (SPA site synopsis, 2015 ¹ ; national importance) 469 occupied sites on Dursey Island in 2000 census ²	No site specific trend data	Breed throughout Beara peninsula, and along northern side of Bantry Bay. Fish farm in core foraging range and close to breeding sites.
Deenish Island and Scariff Island	385 pairs in 2000 (SPA site synopsis, national importance)	No site specific trend data	61 km from site Overlap in mean foraging range ⁵
Iveragh Peninsula	766 pairs (1999-2000; SPA synopsis; national importance.	No site specific trend data	64 km from site Overlap in mean foraging range ⁵ .

1. SPA site synopsis: <https://www.npws.ie/protected-sites>

2. JNCC Seabird monitoring programme: <http://archive.jncc.gov.uk/smp/>

7.1.3 Guillemot

NIS Assessment: No population level impact will result for Guillemot colonies due to the development of the Shot Head salmon farm.

Review of impacts on Guillemot

The Guillemot is of medium conservation concern in Ireland and is a migratory species under the EU Birds Directive. The Irish population is increasing, however breeding numbers in Europe are in decline. Trend data for connected SPA's is lacking (Tables 7.6 and 7.7).

Surveys (Roycroft *et al.* 2007) of Bantry Bay found that Guillemot use Bantry Bay in low densities. While Bantry Bay is within the foraging range of Guillemots breeding on the Iveragh Peninsula, there is no data to link Guillemots from this site to those which use Bantry Bay. However, it can be assumed that Guillemots from breeding sites on the Iveragh Peninsula and from other breeding colonies forage within Bantry Bay.

Guillemot are considered to be moderately sensitive to boat traffic and they may be displaced from potential foraging habitat by boat activity and the construction and operation of the salmon cages. While surveys by Roycroft *et al.* (2007) did not cover the north shore of Bantry Bay between Shot Head and Bere Island i.e. the area where boat activity will be concentrated, based on the data which is available low densities of Guillemot are likely to occur. While the Guillemot predation at fish farms has been recorded, the literature suggests the incidence of this is very low.

Overall Assessment: Guillemot may be displaced from potential foraging habitat by the proposed salmon cages. The fish farm development will lead to a reduction of 0.106% in the available foraging habitat in Bantry Bay. This is not considered to be a significant loss of potential foraging habitat. Boat activity may cause temporary displacement of Guillemots during movements to and from the fish farm site. It is likely that displaced Guillemot will forage elsewhere (moderate flexibility in prey and large foraging range) and it is likely that this displacement effect will not be significant, given the availability of extensive areas of open waters in Bantry Bay. Overall, Guillemot are recorded in low densities in Bantry Bay and not all Guillemot are likely to be from the connected to the Iveragh Peninsula SPA. Significant impacts on breeding success and productivity in connected SPA populations are not considered likely. While the lack of specific data for Guillemot use of the north shore of Bantry Bay (Shot Head to Bere Island) does not alter the findings of this assessment, in the context of overall management of seabird populations, the ongoing need for further data on seabird use and distribution within Bantry Bay is apparent.

Table 7.6: Population and conservation status of Guillemot in Ireland and Europe.

National Pop. 2015-2018 ¹	National Trend (Long term)	BOCCI ² Status Ireland	SPEC Status and trend Europe ³	EC Birds Directive
177,388 individuals	Increasing	Amber (Medium concern)	SPEC 3 ⁴ Decreasing	Migratory species

1. Cummins *et al*, 2019

2. Colhoun & Cummins, 2013.

4. BirdLife International, 2017

5. Species of European Conservation Concern not concentrated in Europe

Table 7.7 Connected SPAs and population trends for Guillemot at SPA sites

Connected SPA	SPA pop. ¹	SPA Pop. trend	Connection
Iveragh Peninsula	2,860 pairs (1999-2000; SPA synopsis; national importance ¹ .	No site specific trend data	64 km from site Overlap in mean max foraging range ⁵ .

1. SPA site synopsis: <https://www.npws.ie/protected-sites>

7.2 Effects – in-combination effects and impacts on SCI species

The potential for existing and planned future developments in Bantry Bay to act together with the proposed Shot Head salmon farm development to give rise to new effects and / or cause previously described effects to be increased must be considered in this assessment. Potentially, additional development could amplify effects with regard to displacement, disruption, reduction in available foraging area or direct mortality. By acting together effects can lead to ‘in-combination’ effects and impacts on the receiving environment, including SCI species and SPA’s, could also be increased. It is noted that neither the AA screening report or NIS identifies activities other than aquaculture activity in their assessment of possible in-combination impact.

The following section reviews in-combination effects and resulting impacts on SCI species and conservation objectives for connected SPA’s, as assessed in the AA screening report and NIS.

Bantry Bay is used for a range of human activities typical of coastal areas, all of which have an “environmental footprint” that needs to be considered in the context of in-combination effects. Existing human use and activities occurring within or in the immediate vicinity of Bantry Bay include:

- Commercial fishing
- Aquaculture
- Marine transport
- Recreational use
- Defense exercise and training

Aside from direct use, as a coastal water body Bantry Bay also and provides a range of ecosystem services such as a receiving environment for run-off and waste water from treatment systems for Castletownbere, Glengarriff and Bantry amongst other towns. As a coastal water body receiving direct inputs and run-off from adjacent catchments, it serves an important role in maintaining overall ecosystem health by recycling nutrients. Many of the habitats of Bantry Bay are important for maintaining marine biodiversity. There are extensive kelp forests which provide breeding habitat and nursery areas for a wide range of species and Bantry Bay plays an important role in maintaining viable populations of commercial fish and shellfish species as well as a diverse range of other marine flora and fauna. A diverse range of seabed sediments also provide shelter and refuge for many species and these are important to the life history of many different species.

A detailed description of other sources of impact is outside the scope of this assessment. However, a summary of potential cumulative impacts from marine cage culture of salmonids in combination with other activities is presented below. In this regard, it is noted that both the earlier AA screening report and NIS have not identified any other potential sources of adverse impacts for relevant SCI species and do not detail if other activities and uses of Bantry Bay could contribute to in-combination effects and thereby impact on SCI species and the achievement or maintenance of established conservation objectives.

7.2.1 Commercial fishing

Castletownbere is the second largest fishery harbour in Ireland, however much of the fishing effort for the fleet associated with this port takes place offshore and as such does not affect or impact on nearby SPA's directly. Potential in-combination effects are associated with that element of the fleet that fish the waters in and around Bantry Bay and adjacent bays. Inshore capture within Bantry and adjacent bays include trap fishing for clawed lobster *Hommarus vulgaris*, Edible crab *Cancer pagurus*, Common prawn *Palaemon serratus*, Velvet crab *Necora puber* and Dublin Bay prawn *Nephrops norvegicus*. Additional activity involves netting for bait fish using set (static) nets for species of wrasse and pollock, fishing of sprat *Sprattus sprattus* with mobile pelagic trawls and fishing of scallops *Pecten maximus* using bottom dredges. Fishing take place in the context of permitted and licensed fishing operations and unlicensed activity is believed to be minimal. Fisheries are managed by the responsible authority (DAFM) and many fisheries are managed with the objective of maximizing long-term yields although it is not clear that this is always achieved. Management of fisheries increasingly takes into account the need to maintain ecosystem health (the ecosystem approach) as well as structure and function and limits on catches are designed to ensure not only sustainable catches but also that adequate resources remain for ecosystem services (e.g forage food for mammals and birds). Many of the shellfish species fished are however not effectively managed, stocks have declined for many species in recent decades and years and control and enforcement is not as well developed for vessels under 10m as they are for larger segments of the fleet. Fisheries have the potential to impact by displacing foraging birds and by causing disturbance. In addition, large scale removal of forage fish species such as sprat, herring or mackerel can cause additional impacts.

Direct mortality of seabirds is a feature of some inshore fisheries where bottom set gillnets are used to enmesh fish and diving seabirds may become entangled underwater and drown. Evidence in relation to direct mortality of some SCI species in fishing (Guillemot and Gannets in particular) is readily available in the literature. Direct mortality of pursuit feeding diving seabirds such as Guillemot and Puffin is known to occur when they become entangled in mobile or set net fishing gears (Tasker et al 2000).

Assessment: for the SCI species concerned, removal of forage fish in seasonal periodic sprat fisheries may cause impacts as competition for forage fish is known to potentially affect some species such as Guillemot and Puffin. However, given the known foraging ranges of the SCI species, it is considered that adequate foraging opportunities exist and the proposed Shot Head salmon farm, together with all existing aquaculture activity in Bantry Bay is highly unlikely to contribute to significant loss of foraging opportunities for any SCI species. Fishing traps and bottom set nets are set on the seabed and displacement effects of surface markers are insignificant as rafting birds quickly become habituated to their presence. While some displacement and disturbance effects (as previously described) are likely to result, displacement by the farm is estimated to be a proportion of the licensed area and birds will be free to forage in and around farm structures. Disturbance will be minimal and relate to regular patterns of vessel movement to and from the farm and use of machinery on the site.

While reducing the available foraging area in Bantry Bay by less than 2%, proposed and existing aquaculture in no way reduces the actual amount of forage fish available.

Direct mortality of seabirds is predicted to be low for the proposed Shot Head farm based on the findings of the NIS, which captures and details the standard mitigations employed, modern salmon husbandry practices and general understanding of risks related to salmon cage culture. There is no evidence that the development and operation of the Shot Head site will lead to a significant increase in mortality rates through any in-combination effect. The proposed Shot Head farm together with all commercial fishing activity is highly unlikely to produce in-combination effects that will impact on SCI species or the conservation objectives for any designated site.

7.2.2 Aquaculture

Intensive and extensive aquaculture of a range of species takes place in Bantry Bay and the adjacent Dunmanus Bay and Kenmare River. In Bantry Bay, the mussel industry is centred east of Whiddy Island and within Glengarriff Harbour, while salmon are farmed east of Bere Island and at Gearies. In Kenmare River intensive salmon aquaculture takes place at sites near Inishfarnard and Deenish Island. There are extensive long-line mussel growing operations within Ardgroom and Kilmakillogue also; while Dunmanus Bay also supports both a bottom grown mussel industry and suspended long-line rope mussel activity.

The Marine Institute has considered the effects of aquaculture in outer Bantry Bay in the 2019 AA screening matrix. The screening has considered likely in-combination effects of all aquaculture in Bantry Bay and was conducted in anticipation of further future aquaculture licence applications and developments in Bantry Bay. The screening considered potential aquaculture related in-combination effects and cumulative impacts on the SCI species and conservation objectives for the closest SPA's - Beara Peninsula SPA and Sheeps Head to Toe Head SPA. The screening concludes that no significant in-combination effects on SCI species or site conservation objectives will arise from the proposed licensing of further shellfish and finfish operations in outer Bantry Bay. Given the distance to SPA sites with SCI species, aquaculture at inner Bantry Bay has not been considered in the AA screening report. It is presumed that this is on the basis that inner Bantry Bay is not considered to be connected to any SPA (or SAC) sites due to geographical remoteness from other sites.

There are currently 4 licensed salmon aquaculture sites in Bantry Bay, with additional sites in Kenmare River. The cages in operation use top nets as standard mitigation against depredation of salmon by piscivorous seabirds. An additional 16 salmon cages are proposed for the site at Shot Head. An increase in the number of salmon cages increases the risk of Gannet predation and entrapment in predator netting at salmon cages and thus the risk of mortality resulting from entanglement. Where there is good practice in top net maintenance and based on the available literature, the risk of entanglement has been assessed as low. However, Gittings (2018) assessed that 1.7 Gannet per fish farm per year would represent a significant increase in annual Gannet mortality rates, with implications for the conservation objectives of connected Special Protection Areas (ie Bull and Cow Rocks SPA). Gittings states that *“without further information on likely 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 fish farm sites in Bantry Bay would result in a significant level of mortality to the Gannet colony in the Bull and Cow Rocks SPA”*.

Assessment: the Gannet population at connected SPA's has been increasing over the last number of years and this trend is consistent with other Irish and UK colonies. This trend has continued with the existence of salmon cages in Bantry Bay, suggesting that any mortality events at these sites are not currently having an impact on connected SPA's. Given the low likelihood of mortality from entanglement, within the context of a stable and increasing population, significant effects on the Bull and Cow Rock SPA Gannet SCI are unlikely. However the Gannet population is not likely to continue to increase indefinitely (Furness et al, 2018) and there are pressures on seabird populations. Seabirds are long lived species with low reproductive outputs. Populations are therefore slow to recover from adult mortality. Given the lack of data on Gannet predation and entanglement, this interaction requires monitoring. Should the Gannet population decline at the Bull and Cow Rock it will be important to evaluate the effect of this interaction. Population Viability Analysis has been considered as a means of measuring population level effects on the Bull and Cow Rock Gannet population. This model requires data on the likely annual Gannet harvest or mortality rate. This data is not available. However, empirical evidence, from an extensive literature review, indicates that, while occasional mortality events may occur, (e.g. related to poor husbandry or extreme weather events) annual mortality is likely to be low and significant impacts on the Bull and Cow Rock SPA population are not considered likely.

Impacts of aquaculture in the context of in-combination effects have been considered in the AA screening report and NIS. The proposed Shot Head farm together with all aquaculture activity is considered highly unlikely to cause in-combination effects that will impact on SCI species or the conservation objectives for any designated site. No significant source-pathway-target vectors have been identified whereby SCI species may be affected by present and proposed levels of additional farming activity.

7.2.3 Navigation and marine transport

Marine infrastructure centers are located at Glengarriff, Bantry, Gearies, Whiddy Island, Bere Island and Castletownbere. Vessel navigation is associated with commercial fishing, aquaculture service vessels, vessel maintenance, naval service operations, ferry traffic to/from Garnish, Whiddy and Bere Islands, tanker traffic to/from the oil terminal as well as tourism, recreational and leisure use. By far the largest proportion of vessel movements are associated with the commercial fishing harbour of Castletownbere where both Irish and foreign fishing vessels are based and off load catches. As such the majority of this traffic enters Berehaven from the west and does not traverse near the proposed Shot Head site. Fishing vessel traffic does not conform to any particular hours and varies according to seasons, tides and weather conditions. Inshore fleets are day boats and traverse sections of the Bantry Bay and Berehaven on a daily basis. Bantry Bay is home to Whiddy Island Oil terminal and in this regard the site is used for unloading, storage and loading of tankers up to 100,000 tonnes DWT. For the purposes of this assessment, no data have been presented with respect to ship movements to/from the terminal. No data has been presented in terms of recreational traffic however this is undoubtedly seasonal in nature and overall very limited in number and frequency of vessel movements.

Assessment: Impacts of navigation in the context of possible in-combination effects do not appear been considered in the AA screening report and NIS. The proposed Shot Head farm together with all marine

navigation and vessel movement activity is considered highly unlikely to cause in-combination effects that will impact on SCI species or the conservation objectives for any designated site. Proportionately, the development of the Shot Head site will cause a small increase in the total number of vessel movements in Bantry Bay. Vessel movements will not be within any SPA site and will be along established navigable corridors that are used extensively by existing aquaculture service and fisheries vessels.

Existing levels of navigation and marine traffic are not known to cause significant displacement or disturbance and the SCI species demonstrate a high degree of tolerance to vessel traffic. Accordingly, no significant source-pathway-target vectors have been identified whereby SCI species may be adversely affected by likely increased levels of vessel traffic in combination with any other effect.

7.2.4 Marine leisure/recreation

Few data have been presented in relation to recreational activities in Bantry Bay. However the Technical Advisors reports summarises such activity. A typical range of inshore leisure activities take place and Bantry Bay is used seasonally by sailing, angling, water sports and eco-tourism interests. Centres of activity are associated with coastal infrastructure such as is located in Bantry, Glengarriff, Castletownbere, and Bere Island. While intensive leisure use of an area can cause displacement and disturbance impacts for SCI species, the level of leisure and recreational is difficult to quantify and it is highly likely that fine scale data is not available from any source. No concerns relating to negative impacts associated with recreational use of Bantry Bay on any receptors (including wildlife) have emerged during the consultation process. General understanding and empirical evidence does not indicate that recreational and leisure use of the southwestern waters gives rise to negative effects on the receiving environment. Being on the 'Wild Atlantic Way' tourism has increased noticeably in recent years along the route and indications are that this applies also to Beara. Some increase in water based activity is likely in future. Increasing marine leisure could in the future lead to effects e.g. water quality discharge effects, that in-combination with aquaculture and/or other activities could lead to in-combination impacts.

Assessment: for the purposes of the present assessment, there is no evidence that marine tourism and leisure activity generally present additional risks of in-combination effects and impacts to SCI species and conservation objectives for any SPA.

7.2.5 Other activities

The Irish Naval service operate a naval firing range from its base on Bere Island. Live firing frequently takes place on the Rifle Range near Leahern's Point, Bere Island. The range includes a significant marine area to the east and south of Bere Island. The site is used for test firing of weaponry at intervals and as such some disturbance to wildlife is inevitable. These events are of short duration but have capacity to cause disturbance, while direct mortality of any SCI species is considered very unlikely to occur. A range of other coastal activities also occur including agriculture, quarrying for aggregate and activities associated with onshore human use. There is an ongoing proposal for the development of industrial kelp harvesting from 1,100ha of seabed habitat in Bantry Bay. A previously issued licence for the activity has been deemed to

not yet have been issued in a court ruling and it is uncertain if this activity will take place in the future under licence. For the purpose of the present assessment, other ongoing and planned aquaculture activities have not been considered likely to produce effects that may, in-combination with the development and operation of the proposed Shot Head farm lead to significant impacts on SCI species. In the event of other large scale future developments or licensing, re-assessment of the AA screening will likely be necessary. The present assessment has not considered possible in-combination effects arising from all aquaculture together with the possible future licensing of kelp-harvesting activity.

Assessment: no evidence of potential in-combination effects have been presented and no source-pathway-impact vectors have been identified as leading to uncertainty over possible in-combination effects in either the AA screening report or NIS. Accordingly, interactions between other activities currently taking place and the SCI species are highly unlikely to lead to any adverse in-combination effect.

Possible in-combination effects from aquaculture and kelp harvesting have not been accounted under in-combination effects on connected SCI's and SPA's as it is not clear whether previously proposed kelp harvesting activity will in the future be licensed.

8. Concluding Statements

The AA screening reports carried out have provided different outcomes in terms of the assessment of risks to SCI species. Crowe (2019) determines that the Fulmar, Guillemot and Gannet in nearby SPA's may be at risk of being impacted by the proposed Shot Head salmon farm development while the Marine Institute has screened out the same species. The differing outcomes are attributable to the fact that the Marine Institute screening matrix has considered SPA sites (Beara Peninsula SPA and Sheep's Head to Toe Head SPA) and associated SCI's that are directly connected to outer Bantry Bay, whereas the AA screening report prepared by Crowe (2019) considers additional more widely distributed sites on the basis that there is ecological connectivity to Bantry Bay and the Shot Head site through the use of Bantry Bay by some SCI species for foraging activity.

Following on from the Screening Stage Assessment Report by Crowe (2019), a Natura Impact Statement was completed. The NIS examined the status of SCI species populations in Ireland and in other areas where salmon farming is substantially more developed. The evidence presented demonstrates that populations of SCI species are stable or increasing in Ireland as well as in areas where salmon farming activity is most developed in the northeast Atlantic; off the west coast of Scotland and Norway, where colonies of Fulmar, Guillemot and Gannets are all increasing or stable despite their relative proximity to marine cage aquaculture centres and where, in some cases, the populations are subject to direct harvesting. While data has been lacking in terms of absolute levels of interactions and mortality of Gannets due to entanglement in predator nets, the status of Gannet populations at local colonies has been increasing steadily, despite the co-existence of marine cage aquaculture in surrounding areas. Data in relation to wildlife interactions for nearby cage farms operated by the applicant for the Shot Head site is voluntarily collected and has been available for this assessment. This demonstrates no lethal interaction with seabirds at any site in recent years.

As part of this assessment process, both generic and precautionary conservation objectives (adapted from the Great Saltee islands SPA conservation objectives) were applied to the SCI species that could potentially be affected by the Shot head development and a precautionary assessment was made. The conclusion of this assessment is that no adverse impacts on the conservation objectives for any SCI species or connected SPA site associated with the development of the proposed Shot Head site will result from the development of the Shot Head site.

Appropriate Assessment of projects is reliant on access to information and data concerning effects and potential impacts of projects on SCI's. This assessment has confirmed that available information and data concerning effects of cage aquaculture and relevant SCI seabird species ecology and populations are, in this instance, adequate to support the assessment of population risks associated with the proposed salmon farm development, as demonstrated by data relating to the ecology and population status and trends for gannet, fulmar and guillemot in Ireland and in the vicinity of other European centres of cage aquaculture, including populations in the vicinity Bantry Bay. Greater transparency concerning the levels of impact could be demonstrated by collecting additional specific data in relation to interactions between aquaculture and seabird species. Voluntary recording of wildlife interactions by cage farms as part of third-party sustainability certifications and industry led transparency initiatives provide a useful general

understanding of interactions and risk levels that supports this assessment's findings. However, regular collection of scientifically robust data would quantify impacts, and would allow detailed specific assessments to be made of interactions and impacts on other (non SCI) species and allow for ongoing monitoring.

A number of recommendations result from this assessment for the Shot Head site:

- In order to ensure that the generally understood level of interaction between marine pen aquaculture and piscivorous seabirds is maintained, standard conditions of operation should require implementation of and regular and effective maintenance of mitigations to prevent seabirds from predating on salmon smolts and becoming entangled in poorly maintained equipment.
- A single bay management approach should be required for the Bantry Bay aquaculture sector in order to manage overall impacts from aquaculture and ensure that development and production is managed and co-ordinated in order to mitigate against adverse effects. The requirement should be implemented and supported by relevant state agencies and responsible authorities with a role in managing aquaculture licensing.
- Reporting of interactions between cage aquaculture and wildlife (SCI and protected species) through open-access publication (e.g via company websites) of data on wildlife interactions and mortality events should be a requirement of future licensing of aquaculture sites

9. Assessment outcome

In the context of the potential impacts on SCI species of connected SPA sites, an assessment of the proposed Shot Head salmon farm has been carried out on the basis of evidence presented in the Marine Institute AA-screening matrix, independent AA screening report and Natura Impact Statement processes, along with a subsequent detailed appraisal and validation of the evidence presented.

The AA process is intended to support an objective and precautionary interpretation of the risks to SCI species associated with developing a marine cage farm at Shot Head and is intended to inform decision makers in making a final determination. In this regard, this assessment has entailed independent review and examination of evidence by an expert team comprising a qualified and experienced ornithologist, marine ecologists and a fisheries aquaculture technical expert with combined wide-ranging knowledge and experience of seabird ecology, marine aquaculture and fisheries and marine ecology.

This assessment concludes that there are no significant lacunae and that risks to SCI species have been identified and appraised. The reasoned conclusion of this process is that the proposed Shot Head farm development will not impact adversely on SCI species or conservation objectives for connected SPA sites.

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Appendix I: Review of entanglement impact - literature

Carrs, 1988. The Effects of Piscivorous Birds on Fish Farms on the West Coast of Scotland. Submitted for the degree of Doctor of Philosophy. UNIVERSITY OF EDINBURGH

Carrs, D.N., 1994. *Killing of piscivorous birds at Scottish fin fish farms, 1984-1987*. Biological Conservation. 68. 181-188.

Carrs, 1998 reported that , “The problem of fish-eating birds was widespread at Scottish fish farms. Grey heron (*Ardea cinerea*), Cormorant (*Phalacrocorax carbo*), Shag (*Phalacrocorax aristotelis*), Coosander (*Mergus merganser*) and Red-Breasted Merganser (*Mergus serrator*), the principal species implicated, were studied in an area on the west coast of Scotland from September 1985 to August 1987. Data were also collected from farms in south Argyll, Highland and Tayside Regions”. All species reported (ie number of farm owners reporting a species as taking stock) number and (%) are listed below (extracted from original thesis). The results of this research are also presented in Carrs, 1994. Questionnaires were sent to 159 Scottish fin fish farms between March and May 1985. A total of 81 questionnaires were returned. Indirect mortality was reported by ten farmers. It was reported that birds sometimes drowned accidentally in underwater anti – predator nest. These included cormorant, guillemot, gannet, shearwater, black-throated diver and unspecified diving ducks. It was stated that most farmers did not attempt to quantify such mortality but their estimates ranged between six Guillemots and on Cormorant per year at one farm and up to five Comorant/Shag per month at another.

- Grey heron (*Ardea cinerea*) 46 (72)
- Cormorant (*Phalacrocorax carbo*) 42 (66)
- Shag (*Phalacrocorax aristotelis*) 30 (47)
- 'Gull' (*Larus spp*) 11 (17)
- Guillemot (*Uria aalge*) 4 (6)
- Black-Headed Gull (*Larus ridibundus*) 3 (5)
- Kingfisher (*Alcedo atthis*) 3 (5)
- Hooded Crow (*Corvus corone corvix*) 2 (3)
- Carrion Crow (*Corvus corone corone*) 2 (3)
- 'Tern' (*Sterna spp*) 2 (3)
- Goosander (*Nergus merganser*) 2 (3)
- Osprey (*Pandion haliaetus*) 2 (3)
- Herring Gull (*Larus argentatus*) 1 (2)
- Common Gull (*Larus canus*) 1 (2)
- Great Northern Diver (*Gavia immer*) 1 (2.)
- Red-Breasted Merganser (*Nergus serrator*) 1 (2)
- Wren (*Troglodytes troglodytes*) 1 (2)
- Dipper (*Cinclus cinclus*) 1 (2)
- Little Auk (*Alle alle*) 1 (2)

Bantry Bay Screening

Beveridge, M 2004. Cage Aquaculture. Third edition published by Blackwell Publishing

There is a risk of birds becoming entangled in the predator mitigation nets attached to fish cages. Beveridge reviews predators at cage fish farms and lists gannet as a predator at salmon and/or trout farms in Scotland. The source of this predation is Mills, 1979 (below). This review could not be sourced and is no longer available from the Institute of Fisheries Management.

Mills, D. (1979) Bird predation – current views. In: Proceedings of the Institute of Fisheries Management, 10th Annual Study Course, Nottingham University, 18–20 September 1979, pp. 264–71. Janssen Services, London.

Quick, N. J., Middlemas, S. J. & Armstrong, J. D. (2004) A survey of anti-predator controls at marine salmon farms in Scotland. *Aquaculture*, 230, 169–80.

A survey of predators at Scottish Fish farms found that seals were the most common predators, being reported at 81% of sites (surveys were sent to 195 sites). Gannets were reported at c. < 10% of sites (c. < 20 sites), followed by Fulmar, small land birds, and Guillemot. Mink, otter, gulls, Comorants, Herons, Shags, Grey seals and Harbour seals were all listed at a greater number of sites than Gannet.

Review of the Environmental Impacts of Salmon Farming in Scotland 02468_0001, Issue 01, 24\01\2018. Prepared by a consortium led by SAMS Research Services. Published by The Scottish Parliament.

The aquaculture sector in Scotland is planned to grow with 163,000 tonnes of salmon produced in 2016 and a predicted growth to 200,000 tonnes in 2020 and 300,000 tonnes in 2030. This study reviews the environmental issues relevant to aquaculture in Scotland and plans for its expansion.

The issue of predators is assessed: “Predators: Deterrence of piscivorous predators by netting, or acoustic methods, or by shooting of seals, might harm populations of protected marine mammals and seabirds”. The “diagnosis” in this review states that ...”Salmon-farms are attractive to marine mammals and birds”. Reasons include “perches (for birds) and sources of food - either the farmed fish, or wild fish (of various species) that are attracted to waste feed, shelter etc. provided by the farms. Birds and mammals, especially seals, may take, injure or frighten farmed fish, or damage nets leading to escapes. Anti-predator nets above net-pens are intended to prevent loss to birds; however, there are few data on the efficiency of this protection. Entanglement in nets above and below water is a potential, although poorly-studied, mortality risk for birds and marine mammals” and it is predicted, “that effects on predators will increase as salmon production increases, but the outcome may depend on factors such as siting of farms in relation to seal haul-out areas, and on the availability of other food for the mammal and bird populations.”

Mitigation is proposed as part of this review and mainly considers seals, but also considers that “Research into entanglement risk to marine mammals and birds might help in designing better and safer gear”.

While Gannets are not included in the review, they describe that “Indirect mortality of seabirds and marine mammals owing to entanglement in ropes, lines, nets and other artificial materials is a significant cause of mortality for many marine species worldwide, mostly associated with commercial fisheries....Nonetheless, animals foraging in the immediate vicinity of fish farms can also become entangled among the cages, anti-predator netting and/or mooring lines. In the Scottish context, this mortality can include a range of species including birds and marine mammals. Despite several early studies indicating that entanglement among fish farm infrastructure could be significant (e.g. Carss, 1993; 1994), there is little current information on actual

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numbers of animals involved. Accordingly, the impact of this mortality on wild populations of marine mammals and birds remains difficult to assess” They refer to a report of “at least one case of a humpback whale (*Megaptera novaeangaliae*) entanglement involving a salmon aquaculture sea pen off Scotland” and state that, “It has been suggested that increased tensioning of anti-predator nets may reduce entanglement risk for birds and pinnipeds.....However, in Scotland, detailed and standardised reporting of bird and marine mammal entanglement in aquaculture infrastructure is currently lacking. This makes it difficult to properly assess the risk and develop potential solutions to the problem of entanglement interactions”.

This review also refers to, “Local changes to prey abundance” describing that, “significant numbers of wild fish (like saithe, *Pollachius virens*) can be attracted to the vicinity of fish. These concentrations of wild fish may in turn attract top predators, including marine mammals and birds. Little is currently known about the extent to which Scottish salmon farms might aggregate wild populations of prey fish and attract marine mammals and birds, although there are some suggestions that foraging around fish farms may be locally important. For example, research by Carss on stomach contents of great cormorants shot close to fish farms in western Scotland suggested that most fish consumed had come from wild fish populations. In addition, birds appear to be attracted by the physical structure of fish farms (which may serve as roosting platforms) and by waste feed. Although quantitative information is lacking, it seems likely that marine mammals common in Scottish waters, including seals, harbour porpoises and bottlenose dolphins, could also be attracted to fish farms by increased densities of, and enhanced opportunities for feeding on, wild prey. This indirect effect of at-sea aquaculture on marine mammal and seabird behaviour may increase risks of depredation, exposure to noise pollution, entanglement or other interactions with fish farms as summarized here, but further information is needed”.

European Economic Interest Group (undated) THE N2K GROUP Overview of the potential interactions and impacts of commercial fishing methods on marine habitat and species protected under the EU Habitats Directive.

Impacts from floating finfish cages, for species such as salmon were described and included:

Mortality following accidental entanglement in fishing gear. Examples were as follows - entanglement in static nets such as gill nets, entangling nets and trammel nets (guillemot, razorbill, Leach's petrel, gannet, Cory's shearwater, Balearic shearwaters, redthroated diver, black throated diver, common scoter, velvet scoter, eider, scaup) - entanglement in drift nets (guillemot, razorbill northern fulmar) - entanglement in anti-predator nets

Appropriate Assessment of the Draft National Strategic Plan for Sustainable Aquaculture Development 2015. Dept Agriculture, Fisheries and Food.

Potential interactions between marine cage culture and the environment were reviewed. This review described that, “Cages can attract predators (wild fish, piscivorous birds, aquatic mammals), which may cause damage to the netting.....Modern cage design, ensuring that nets are maintained tensile, predator nets and approved acoustic deterrent devices help manage this issue”.

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F. Aguado-Giemenez *et al*, 2016 *Aggregation of European storm-petrel (Hydrobates pelagicus ssp.melitensis) around cage fish farms. Do they benefit from the farms resources?* Marine Environmental Research 122

This papers refers to marine cage fish farms acting as strong Fish Aggregation Devices attracting many bird species, many finding roosting and shelfter. The research relates to the western Mediterranean Sea where “some roosting piscivorous birds (cormorants, shags and herons) concentrate in large numbers around fish farms and usually prey on cultured fish becoming an obvious source of conflict”.

Appendix 2. Marine Institute AA Screening Matrix for Bantry Bay

v: March 6 2019

Screening Matrix for Aquaculture activities in outer Bantry Bay, Co. Cork	
Brief description of the project or plan	<p>The following species are cultured in outer Bantry Bay (number of licences in parenthesis) - oysters (10) clams (1) abalone (1), sea urchins (1), mussels (8), and finfish (4). Additionally, applications have been received for the following species - oysters (12), scallops (5), clams (1), sea urchins (2), mussels (13), kelp/seaweed (1) and finfish (1). The locations of the sites are shown in Figure 1.</p>
Brief description of the Natura 2000 sites	<p>Bantry Bay is approximately 39km long and ranges in width from 3km at the eastern end to 22km at the mouth. The area of outer Bantry Bay in question is not located within any Natura 2000 sites. However, - it is bordered by two SACs, the Sheeps Head cSAC and the Glengarriff Harbour and Woodland SAC and two SPAs, Beara Peninsula SPA and Sheeps Head to Toe Head SPA. (see Figure 1).</p> <p>Adjacent Sites:</p> <p>Sheep's Head SAC (Site code: 000102) is located on the southern approaches to Bantry Bay, extends to Three Castle Head and Mizen Head to the south. It is a narrow ridge of sandstone which encloses a number of rectangular basins filled either by peat bogs or lakes. The main value of the area is the presence of the terrestrial features, dry heath and wet heath, habitats listed on Annex II of the EU Habitats Directive. In addition, Annex I Birds Directive species, the Chough, and an Annex II species under the Habitats Directive, the Kerry Slug, are found in the area.</p> <p>The Glengarriff Harbour and Woodland SAC (Site Code 00090) consists of a glacial valley opening out into a sheltered bay with rocky islets. The site supports populations of the Kerry Slug (<i>Geomalacus maculosus</i>), the freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) as well as the largest colony of Common Seals (<i>Phoca vitulina</i>) in the south-west of Ireland, all of which are listed on Annex II of the Habitats Directive.</p> <p>Beara Peninsula SPA (Site Code: 004155) is a coastal site parts of which border the northern shore of Bantry Bay. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Chough and Fulmar. In addition the presence of Peregrine falcon is of particular significance.</p> <p>Sheeps Head to Toe Head SPA (Site Code: 004156) large site situated on the south-west coast of Co. Cork. Adjacent Bantry Bay the site includes sea cliffs, the land adjacent to the cliff edge and is one of the most important sites in the country for Chough. The presence of Peregrine falcon is of particular significance.</p>

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Assessment criteria	
<p>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.</p>	<p>Oysters, clams, abalone, urchins, scallop, mussels and finfish are cultured in Bantry Bay. In addition, there are applications to culture macroalgae (Kelp).</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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 (ssed) 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 dependant upon a number of factors including water depth, the floatation provided and the carrying capacity of the system.</p> <p>Scallops are culture intensively (bags suspended from longlines) and extensively (spread on the seafloor and harvest via dredging and/or diving).</p> <p>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.</p> <p>Kelp is cultured using longlines supported by floating structures similar to those used for mussel culture.</p>
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:</p>	
<p>size and scale;</p>	<p>There are no direct or indirect impacts from the culture operations on any of the SACs or SPAs adjacent to outer</p>

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	Bantry Bay.
Distance from the Natura 2000 site or key features of the site:	The activities in question occur within outer Bantry Bay the mouth of which is adjacent to the Sheeps Head cSAC, the Glengarriff Harbour and Woodland SAC, the Beara Peninsula SPA and Sheep's Head to Toe Head SPA (see Figure 1).
Resource requirements (water abstraction etc.):	<p>Cultured bivalves (oysters, clams, scallops and mussels) are filter feeders and they feed upon suspended particulate matter. They selectively ingest phytoplankton and other organic material (e.g. small zooplankton and bacteria) and dispose of inorganic and larger organic matter in pseudofeces, which is excreted into the water column. Typically the fecal and pseudofecal pellets will fall to the sea floor and may cause localised organic enrichment and/or sedimentation. The level of enrichment is a function of, <i>inter alia</i>, water depth current speed, density of culture, the quantity of suspended particulate matter in the water column, or a combination of these. The shellfish production activities do not use any resources required by the qualifying features within the Natura 2000 sites.</p> <p>Abalone and urchin culture are carried out in contained systems and rely on the input of feed (usually seaweed sourced locally). The production of these shellfish species does not use any resources required by the qualifying features within the Natura 2000 sites</p> <p>Finfish culture differs from shellfish culture in that there is an input of feed into the system and as a consequence a net input of organic matter to the system. This material will be found in the system in the form of waste feed (on the seafloor), solid waste (faeces), waste as a consequence of net-cleaning all of which usually accumulates on the seafloor and dissolved material (predominantly fractions rich in nitrogen). For the most part, the majority of organic material builds up on the seabed generally in and around the footprint of the salmon cages with a 'halo' effect evident in areas where dispersion occurs driven by local hydrographic conditions. This is typically referred to as <i>near-field</i> effects. Similar to shellfish, the quantity of material that might accumulate on the seabed will be a function of the quantity of fish held in cages, the stage of culture, the health of the fish (unhealthy fish will generally eat less), husbandry practices (are the fish fed too much too quickly?), the physical characteristic of the solid particles and surrounding hydrographic conditions. The production of finfish does not use any resources required by the qualifying features within the Natura 2000 sites</p> <p>The culture of kelp is reliant upon ambient nutrient levels in the water column and solar illumination. The production of Kelp does not use any resources required by the qualifying features of adjacent Natura sites.</p>

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Emissions (disposal to land, water or air):	There will be no direct or indirect effects on the adjacent Natura 2000 site.
Excavation requirements:	There are no excavation or similar activities associated with the aquaculture activity
Transportation requirements:	The produced aquaculture products are transported offsite by lorry using the existing national road network with no impact on the adjoining Natura 2000 sites.
Duration of construction, operation, decommissioning:	None
Other:	None

Describe any likely changes to the site arising as a result of:	
Reduction of habitat area:	There is no reduction in habitat area within any of the Natura 2000 sites considered arising from the shellfish production activities.
Disturbance to key species:	There is no evidence in the scientific literature to suggest that aquaculture activities impact on seal species (Feature of Glengarrif Harbour and Woodlands SAC) and the bird species listed in the SPAs, i.e., Chough, Fulmar and Peregrine. Furthermore, any impacts on habitats are likely to be local and not extend beyond the footprint of the activities. Therefore they are not likely to impact on any of the adjacent SACs.
Habitat or species fragmentation:	There is no habitat or species fragmentation within the Natura 2000 sites arising from the aquaculture production activities.
Reduction in species density:	There is no reduction in species density within the Natura 2000 sites arising from the shellfish production activities.
Changes in key indicators of conservation value (water quality):	There are no changes in key indicators of conservation value within the Natura 2000 sites arising from the shellfish production activities.
Climate change:	Given the nature and scale of the aquaculture production activities the contribution to climate change is considered insignificant.

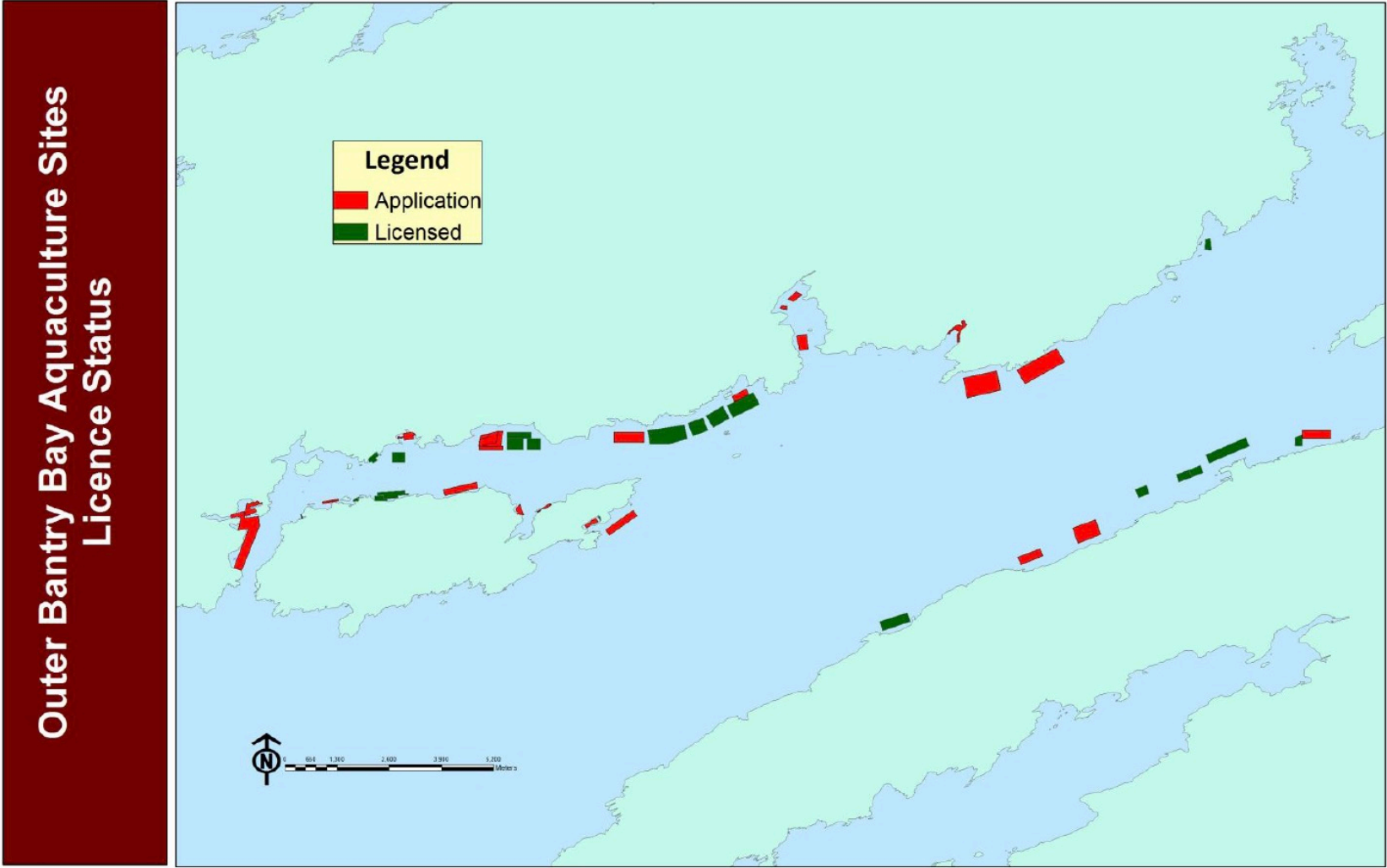
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Describe any likely impacts on the Natura 2000 site as a whole in term of;	
Interference with the key relationships that define the structure of the site:	None of the activities associated with the shellfish and finfish production in outer Bantry Bay will interfere with the key relationships that define the structure of the adjacent Natura 2000 sites.
Provide indicators of significance as a result of the identification of effects set out above in terms of:	None identified
None identified:	None identified
Fragmentation:	None identified
Disruption:	None identified
Disturbance:	None identified
Change to key elements of the site (e.g. water quality etc.):	None identified
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	None identified

Finding of no significance effect report:	
Name of project or plan:	Aquaculture activities in outer Bantry Bay, Co. Cork.
Name and location of Natura 2000 site It would be helpful for a map or plan to be provided:	The Sheeps Head cSAC, the Glengarriff Harbour and Woodland SAC, the Beara Peninsula SPA and the Sheeps Head to Toe Head SPA, (Figure 1).
Description of the project or plan	The plan is to licence the shellfish and fish culture activity in Bantry Bay, Co. Cork. The activities in question cover approx. 547 ha. in total, representing approximately 1.2% of the surface area of Bantry Bay.
Is the project or plan directly connected with or necessary to the management of the site (provide details)?	No.
Are there other projects or plans that together with the project or plan being assessed could affect the site (provide details)?	No.
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.	The cultivation of shellfish, finfish and macroalgae in outer Bantry Bay is not likely to affect the features of adjoining Natura 2000 sites.
Explain why these effects are not considered significant.	<p>There is no spatial overlap of the aquaculture activities with Natura sites. In addition, there would be no interference with key relationships that define the function of the sites. The culture activities will not result in habitat loss, there will not be significant disturbance to key species and there will be no habitat or species fragmentation. There will be no direct discharge of pollutants into the environment during the works and water quality will not be affected. Consequently, it is concluded that the culture of shellfish and finfish, as it is currently constituted and proposed, in Bantry Bay does not pose significant risk to the conservation features of the adjacent sites and as such does not require a full appropriate assessment.</p> <p>On the basis of the above it is considered that there will be <u>no significant effects</u> on the qualifying interests' of the Natura 2000 sites.</p>
Who carried out the assessment?	Marine Institute

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Figure 1. Aquaculture site status within the region of Outer Bantry Bay, Co. Cork.



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Figure 2. Aquaculture activities and Natura Sites within the region of Outer Bantry Bay, Co. Cork.

