Report supporting the Environmental Impact Assessment of the intensive finfish aquaculture licence application T06-202 at Deenish Island, Co. Kerry.



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1 Introduction

Silver King Seafoods Limited (Comhlucht Iascaireachta Fanad Teoranta (CIFT) trading as MOWI Ireland)(the applicant) has applied for licences (aquaculture and foreshore) for the intensive culture of Atlantic Salmon (*Salmo salar*) in net pens at a site located off Deenish Island (T06-202), a small island situated approximately 5 km off the Co. Kerry coast between Ballinskelligs and Kenmare Bays.

The aquaculture licence renewal and review application includes a request to grow Atlantic salmon (*Salmo salar*) in open pen aquaculture and to:

1) amend the boundaries of the licenced area (to increase from approximately 14.5ha to 33.5ha).
2) amend operating conditions attached to the licence to allow a maximum allowable biomass (MAB) of 2,200 t at the site.
3) a maximum number of 15 pens.

Salmon aquaculture has been carried out at this location for over 30 years. The licence expired on 15/02/2007 and has been operational under Section 19A(4) of the Fisheries (Amendment) Act, 1997[1] since that time. The site lay fallow from 2007 to 2010.

The net pens will be of heavy duty polyethylene structure and mesh nets, set out in a 5x3 grid arrangement. The pens will have a 126m circumference and a net wall depth of 11m and a depth to the cone of 20, except for two pens in the northwest of the site that will each have a net wall depth of 8m and a depth to cone of 12m, due to the water depth in that area. The total capacity will be in the region of 250,000 m^3 (approximately 17,000 m^3 per pen with 11m wall and 13,000 m^3 per pen with 8m wall). These will be supported within heavy duty polyethylene or steel base frames set at regular intervals around the floatation ring, upon which stanchions will be mounted to support the heavy duty handrail that runs around the pen. Pen nets, mooring, bridles and sinker ropes will be supported off the base frames. Fence nets and bird (top) nets will be supported off the handrails and stanchions. The submerged mooring grid is a heavy-duty rope-work structure comprising a series of squares, each of which supports a pen, and is anchored to the sea bed. Each corner will be supported by a buoy. Each mooring will comprise a heavyweight braided nylon rope running from each grid corner, attached to a length of heavy-duty anchor chain and a 1 t to 1.5 t anchor. Radar reflectors and navigational lights (4 sec 2 mile) will be positioned on the four corners of the grid block, also corner buoys with navigation lights will mark the 4 outer comers of the proposed site. The lights will be attached to the stanchion of the pens, or moored independently.

[1] *Fisheries (Amendment) Act 1997 Link*

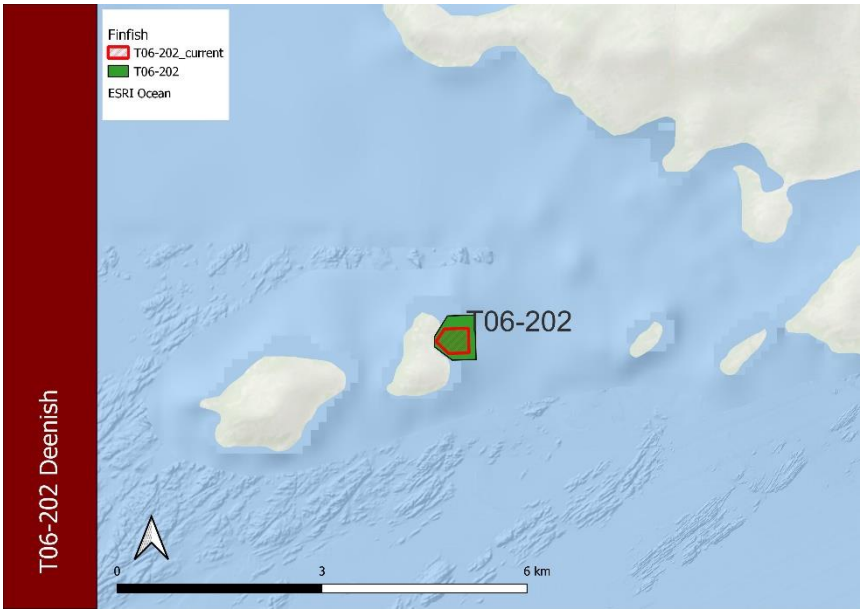

Figure 1-1 Location of the application site, and current site.

The site will be operated under a 2-year production cycle. Month 1 (Mar y1) to month 16 (Jun y2) will be used for growing salmon, months 17 (Jul y2) to month 21 (Nov y2) will be for harvesting. There will be a fallow period of 2+ months from month 22 (Dec y2) through to month 24 (Feb). The proposed production cycle will produce approximately 2,672 t of salmon per growth cycle (of 22 months). The mean cycle Feed Conversion Rate for the stock held at the site is projected to be 1.25. The maximum stocking density of MOWI salmon farms in Ireland is 10 kg/m³, in line with their organic standards. The applicant details this as being considered low, based on the Food and Agricultural Organisation Salmo Salar cultured aquatic species fact sheet which states "Maximum stocking densities of up to 20 kg/m³ are usual." (FAO-*Salmo salar*[2]). For comparison, RSPCA welfare standards for Farmed Atlantic salmon state a maximum of 17 kg/m³ per pen and 15 kg/m³ per site. As part of pest control, cleaner fish will be utilised on site and generally stocked at a rate of 5 to 7 fish per 100 salmon, by number, when used.

A feed barge (length 24 m x beam 10 m) would be used to feed the stock automatically via a pipe distribution system using compressed air.

Nets will be made of knotless nylon sheeting. No net antifouling treatment will be used. The mesh size will range from 16mm to 24mm depending on life stage of the stock. Nets will be cleaned *in-situ using* a pressure washer, with regular diver inspections for maintenance and condition. Top nets, used to protect stock from potential predators, have a mesh size of 80mm.

[2] https://www.fao.org/fishery/docs/CDrom/aquaculture/I1129m/file/en/en_atlanticsalmon.htm

Harvesting will be on-board a dedicated harvest vessel moored alongside the pen, and the harvest vessel will transfer the fish (along with all the ice and water contained in the well tanks) into chilled tankers for road transit to the packing station near Letterkenny, Co. Donegal.

Freshwater treatments at Deenish would be carried out using a well-boat. The Ronja Fjord and Aqua Transporter well-boats have been used for this purpose at Deenish in the past. The Aqua Transporter has the capacity to desalinate saltwater and can transfer freshwater to the Ronja Fjord if that is needed.

The proposed Deenish operation will use the harbours at Westcove and Derrynane Pier in County Kerry and Ballycrovane, Travara, and Castletownbere in County Cork.

The operations since 2007 have been on the 14.5 ha site. This site is to be fully overlapped by the proposed application. Production cycles varied over the period, but all were equal or lessor impacting than the all-in-all-out 24-month, 2,200 t per cycle, currently proposed in this application.

The information and the conclusions set out in this report are relevant and apply to both the assessment of the proposed aquaculture activities and the aquaculture activities undertaken since the expiry of the previous aquaculture licence, covering the period that aquaculture activities have operated under Section 19A(4) of the Fisheries (Amendment) Act 1997.

1.1 Purpose of this Report

The purpose of this report is to inform a reasoned conclusion, to be integrated into the decision of the regulatory authority (Department of Agriculture Food and the Marine-DAFM), regarding the suitability to consent this licence application, based on environmental sustainability and performance (significant effects on the environment), informed by the EIAR documentation supplied with the application and observations from the consultation processes, and, where appropriate, any supplementary information.

The document should provide a description of any features and measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment ('mitigation measures'); and monitoring measures, where appropriate.

Observations relating to the Natura 2000 sites and the Appropriate Assessment process are addresses in separate reports.

1.2 Legislative Framework and Permissions Required

The development of the salmon farm requires a number of permits and consents, including:

- An Aquaculture Licence, from the Minister for Agriculture, Food and the Marine under the Fisheries (Amendment) Act, 1997.
- A Foreshore licence, from the Minister for Agriculture, Food and the Marine under the Foreshore Act 1933 (as amended).
- A Fish Health Authorisation, from the Marine Institute, under the European Communities (Health of Aquaculture Animals and Products) Regulations 2008 (S.I. No. 261 of 2008), European Communities (Health of Aquaculture Animals and Products (Amendment) Regulations 2010 (S.I. No. 398 of 2010) and European Communities Health of Aquaculture Animals and Products (Amendment) Regulations 2011 (S.I. No. 430 of 2011).

This report jointly deals with the applications for an Aquaculture and a Foreshore Licence.

1.3 EIAR

An Environmental Impact Assessment Report (EIAR) is a report of the effects, if any, which the proposed development, if carried out, would have on the environment, and includes the information specified in Annex IV of the Environmental Impact Assessment Directive. The EIAR is prepared by the applicant and is submitted to the Competent Authority (DAFM) as part of a consent process. The Competent Authority uses the information provided to assess the environmental effects of the project and, in the context of other considerations, to help determine if consent should be granted. The information in the EIAR is also used by other parties to understand the significant effects of the project and its effects and to inform their submissions to DAFM.

The EIAR presents the results of a systematic analysis and assessment of the significant effects of a proposed project on the receiving environment. The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and these factors must be addressed in the EIAR. These are:

1) **Population and human health**.
2) **Biodiversity**, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC.
3) **Land, soil, water, air and climate**.
4) **Material assets, cultural heritage and the landscape**.
5) **And the interaction between the factors** identified in points 1-4, above.

As part of the decision-making process the DAFM consults with the following list of Statutory Consultees, as identified under the Aquaculture (Licence Applications) Regulations 1998, as amended

(SI 236 of 1998). These bodies are free to provide opinions on the proposal and highlight any relevant issues to the Department on any aspect of the application:

- An Taisce – the National Trust for Ireland.
- Bord Iascaigh Mhara.
- Commissioners of Irish Lights.
- Fáilte Ireland.
- Harbour Authority within the meaning of the Harbours Act, 1946 , or a company established under the Harbours Act, 1996 , as appropriate, if the proposed aquaculture is to take place in, or contiguous to, its functional area.
- Inland Fisheries Ireland.
- Irish Water.
- Local Authority (County or City Council), relevant to the area in which the activity is proposed.
- Marine Institute.
- Marine Survey Office.
- Minister for Housing, Local Government, and Heritage.
- Sea Fisheries Protection Authority.
- Údarás na Gaeltachta, if the proposed aquaculture is to take place in, or contiguous to, its functional area.

Scientific advice on the factors identified above are scrutinised in this report. While certain subject areas are not characteristically considered within the remit of the Marine Institute, environmental aspects relating to Population and human health(1), and many elements of Material assets, cultural heritage and the landscape(4) are addressed, supported by the statutory consultation process, and by provisions in relation to areas outside of the MI's remit from the Marine Engineering Department of DAFM.

1.4 Information Sources

In addition to scientific and technical publications the following material inform the assessment and consenting recommendations:

- EIA Vol 1 – Non-technical Summary - Renewal of Marine Finfish Aquaculture Licence at Deenish Island, Co. Kerry, Licence Site Ref: T6/202, dated June 2022
- EIA Vol 2 – Main report - Renewal of Marine Finfish Aquaculture Licence at Deenish Island, Co. Kerry Licence Site Ref: T6/202, June 2022.

- EIA Vol 3 – Appendices - Renewal of Marine Finfish Aquaculture Licence at Deenish Island, Co. Kerry, Licence Site Ref: T6/202, dated June 2022
- Submissions received on foot of Public Consultation
- Submissions received on foot of Statutory Consultation
- The applicant's responses to these submissions.

2 EIAR Assessment

The following sections set out the MI's examination of the EIAR for site T06-202 at Deenish, Co. Kerry (dated June 2022) and associated documents, based on the format and information supplied in the application documents and the consultation documents.

The format of the report provides an overview of the information provided by the applicant in the EIAR document, along with a summary of the conclusions reached by the applicant in that report. The terminology used in these sections are the terminology used by the applicant in their EIA report, and are not necessarily consider final or correct by the Marine Institute. The sections headed 'MI Supplemental' are where the specific scientific observations of the Marine Institute are expressed and clarified, and any pertinent supplementary information is provided.

2.1 Project Description, Alternatives & Methodology

2.1.1 Project Description

The project as proposed by the applicant, is detailed in the *Environmental Impact Assessment Volume 2 - Main Report - Renewal of Marine Finfish Aquaculture Licence at Deenish Island, Co. Kerry Licence Site Ref: T6/202* Report, with supplementary information included within 12 appendices (regarding operating procedures, benthic audits, certification, modelling, etc.), and is summarised in the introduction to this document.

2.2 Methodology

The EIAR provided by the applicant for this project and the methods used to assess the significance of impacts by the applicant was undertaken with regard to legislation and guidance as set out in Secvtion1.3 of the Vol. 2 main EIAR document.

This examination of the information provided by the Marine institute is informed by the following documents:

- European Council Environmental Impact Assessment (EIA) Directive 2011/92/EU of 13th December 2011 on the assessment of the effects of certain public and private projects on the environment and as amended by Directive 2014/52/EU of 16 April 2014[3].
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018[4]

[3] DIRECTIVE 2014/52/EU Link
[4] *EU Regs 2018 - https://www.irishstatutebook.ie/eli/2018/si/296/made/en/print*

- EPA. 2022. Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – May 2022 (EPA, 2022)[5].
- Guidance on Aquaculture and Natura 2000 – Sustainable aquaculture activities in the context of the Natura 2000 Network - EC, 2018[6]
- Environmental Impact Assessment Directive – advice and guidance[7]
- Fisheries (Amendment) Act, 1997.
- Foreshore Act, 1933.
- Aquaculture (Licence Application) Regulations, 1998, as amended.
- CIEEM. 2024. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3[8].
- Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN)[9]. Marine Biological Association of the UK (Tyler-Walters et al., 2018)[10].
- SNH. 2018. Environmental Impact Assessment Handbook. Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland. Version 5 [11].

For each subject matter and pressure (or impact mechanism), the environmental impacts are assessed based on their significance, focusing on meaningful effects. This significance is determined by evaluating both the magnitude of the impact (e.g. scale, duration, and extent) and the sensitivity of the receiving environment (e.g. ecological value or vulnerability). Together, these factors provide a structured and transparent basis for identifying which impacts are likely to occur and to determine their significance.

This here report provides the MI's consideration of the EIAR and commentary to the Competent Authority regarding conclusions.

[5] EPA. 2022. Guidelines on the information to be contained in EIARs. Link
[6] EC Guidance on Aquaculture and Natura 2000. *Link*
[7] EIA Directive - Link
[8] CIEEM (2024) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Link
[9] The Marine Life Information Network *Link*
[10] Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T., 2018. Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. Link
[11] NatureScot (previously Scottish Natural Heritage). 2018. Environmental Impact Assessment Handbook Link

2.3 Biodiversity

2.3.1 Conservation sites

The Deenish site is located in Kenmare River Special Area of Conservation (SAC) and Deenish Island and Scariff Island Special Protection Area (SPA). The EIA examined the potential impacts of the farm on protected habitats and species and it was determined that there would be no significant effects.

The interactions with Natura 2000 sites and relevant conservation features are dealt with in a separate process – which is reported on in the *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]* document, dated Oct 2025.

Conclusion

A report titled *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]*, dated Jan 2026, has been prepared by the Marine Institute, along with a *RISK ASSESSMENT FOR ANNEX IV SPECIES Intensive Aquaculture Deenish, Kenmare Bay (T06/202)*, dated September 2023 which have considered protected habitats and species.

Following these reports and the Appropriate Assessment process, the conclusions are that in light of the information presented in the NIS document, and the preventative and mitigation measures prescribed, it can be concluded that the proposed operations will not pose a risk of adversely affecting (either directly or indirectly) the integrity of the Natura 2000 sites, either alone or in combination with other plans and projects, and that there is no reasonable scientific doubt in relation to this conclusion.

2.3.2 Benthic Ecology

The potential sources of impact to benthic habitats are identified by the applicant as:

- organic enrichment due to settleable solids discharged from the fish site which comprised fish faeces and feed waste.
- solid wastes arising from the culture of fish can impact the seabed and associated benthic communities.

The assessment methodology and the receiving environment are described.

2.3.2.1.1 Annual Benthic Audits

The results of benthic surveys (Annual Benthic Audits) carried out during 2018 and 2019 are described in the EIAR, and an assessment provided, along with photographic documentation from both surveys.

The EIAR concludes that, on the basis of the surveys undertaken in 2018 and 2019 (in EIAR Appendix 6), the benthic community in the vicinity of the site can tolerate the tonnages produced in those years (from the benthic reports supplied, the tonnage was 1,532.7 t in 2018, and 344.8 t in 2019). It states that in general, the seabed at the stations located at the edge of the pens and beyond appear to be in good condition and showed no signs of impact from the adjacent finfish activities. It concludes that the operations at the proposed site, together with the mitigation measures proposed (i.e. implementation of a fallow period), will not significantly affect benthic ecology - any disturbance experienced will be temporary with the species characterising the community types recovering to pre-disturbed state, over time, following cessation of activity.

2.3.2.1.2 Aquaculture Stewardship Council Accreditation

Environmental impact monitoring to support product certification is described and an assessment provided. Under this certification the impacts should be confined to an allowable zone of effect (AZE), which for this site is 30 m equivalent ellipse axis of approximately 64 m from the edge of the surveyed pen along the long axis and 10 m outside the edge on the narrow axis. Impacts are assessed, utilising the AZTI (Ciencia y tecnología marina y alimentaria Derio) Marine Benthic Index (AMBI) and disturbance classifications.

This assessment concluded that the operations at the proposed site, together with the mitigation measures proposed (i.e. implementation of a fallow period), will not significantly affect the benthic ecology. Any disturbance experienced will be temporary with the species characterising the community types recovering, over time, to pre-disturbed state following cessation of activity.

2.3.2.1.3 Annex I Benthic Habitats

Likely effects of the proposed project to benthic communities are assessed, with consideration of the constituent community complexes, in light of their conservation objectives. Three-dimensional hydrodynamic simulation modelling was undertaken to determine the transport and dispersion of settleable solids surrounding the site, and inform the assessment. The sedimentation footprint was found to overlap 4 community types.

It concluded, by the applicant, that in light the Conservation Objectives defined for the Kenmare River SAC the operations at the Deenish Island site will not significantly affect Annex I benthic habitats for which the SAC is designated.

2.3.2.1.4 Mitigation Measures

Organic enrichment due to settleable solids discharged from the fish site is identified as the main source of potential impact to marine benthic habitats. The potential effects of settleable solids will be

mitigated through the implementation of fallow periods, of 3 months after each production cycle, between production cycles at the site. This fallow period will occur over the winter months when the site is at its most hydroactive (sic) thereby, allowing dispersal of solids that may have accumulated under the pens during the production cycle. It is considered that the fallow period also allows sufficient time for the seabed sediments and associated faunal community to recover to pre-production state.

2.3.2.2 Applicant Conclusion

The overall conclusion of the report is that operations at the proposed site, together with the mitigation measures proposed, will not significantly affect benthic ecology or Annex I benthic habitats of the Kenmare SAC in light the Conservation Objectives.

2.3.2.3 MI Supplemental

Intensive farming of finfish in open sea pens results in the release of organic and inorganic effluents in the form of waste feed, faeces, and metabolic by-products to the surrounding aquatic environments and exerts impacts on the structure and functioning of benthic coastal ecosystems[12,13,14,15]. The extent of these impacts depends on a range of conditions at the fish farm and the wider environment (farm size, biomass production, duration of the operation of the farm, water depth, current velocities, topography, and substrate)(Holmer *et al* 2005[16]; Tarranger *et al*, 2015). Sedimentation and impacts typically follow an impact gradient that decreases with increasing distance from the pens[17,18], these changes generally follow the model described by Pearson & Rosenberg[19], characterised by reduced species diversity close to fish pens and increased abundance of opportunistic species[20]. Previous studies, in Norway, have reported a relatively limited spatial dispersion of organic wastes, with

[12] Carroll, M.L., Cochrane, S., Fieler, R., Velvin, R. & White, P. (2003). Organic enrichment of sediments from salmon farming in Norway: environmental factors, management practices, and monitoring techniques. Aquaculture, 226(1-4), 165–180.
[13] Keeley, N.B., Macleod, C.K., Hopkins, G.A. & Forrest, B.M. (2014). Spatial and temporal dynamics in macrobenthos during recovery from salmon farm induced organic enrichment: when is recovery complete? Marine Pollution Bulletin, 80(1-2), 250–262.
[14] Taranger, G.L., Karlsen, Ø., Bannister, R.J., Glover, K.A., Husa, V., Karlsbakk, E. et al. (2015). Risk assessment of the environmental impact of Norwegian Atlantic salmon farming. ICES Journal of Marine Science, 72(3), 997–1021
[15] Wilson, A., Magill, S. & Black, K.D. (2009). Review of environmental impact assessment and monitoring in salmon aquaculture. In FAO: Environmental impact assessment and monitoring in aquaculture. FAO Fisheries and Aquaculture Technical Paper No. 527, Rome, FAO pp. 455–535.
[16] Holmer, M., Wildish, D. & Hargrave, B. (2005). Organic enrichment from marine finfish aquaculture and effects on sediment biogeochemical processes. In: Environmental effects of marine finfish aquaculture, handbook of environmental chemistry. Berlin, Heidelberg: Springer, pp. 181–206
[17] Carvajalino-Fernández, M.A., Sævik, P.N., Johnsen, I.A., Albretsen, J. & Keeley, N.B. (2020). Simulating particle organic matter dispersal beneath Atlantic salmon fish farms using different resuspension approaches. Marine Pollution Bulletin, 161, 111685.
[18] Pérez, O.M., Telfer, T.C., Beveridge, M.C.M. & Ross, L.G. (2002). Geographical information systems (GIS) as a simple tool to aid modelling of particulate waste distribution at marine fish cage sites. Estuarine, Coastal and Shelf Science, 54(4), 761–768.
[19] Pearson, T.H. & Rosenberg, R. (1978). Macrobenthic succession in relation to organic enrichment and pollution in the marine environment. Oceanography and Marine Biology: an Annual Review, 16, 229–311
[20] Sanz-Lázaro, C. & Marín, A. (2011). Diversity patterns of benthic macrofauna caused by marine fish farming. Diversity, 3(2), 176–199.

substantial deposition primarily occurring within the initial 100 m from the farm, with a levelling off observed within 200–250 m distance[21,22,23].

As a condition of licenced finfish aquaculture sites in Ireland, the Department of Agriculture, Food and the Marine requires that active sites implement *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring*[24] regarding an annual benthic survey. This Protocol was updated in 2008 to include guideline impact criteria, which introduced the Allowable Zone of Effect (AZE) and outlined the parameter requirements to remain within tolerable benthic impaction from the activity. A review of the available historical benthic surveys for the site (T06-202A) demonstrates that this site has complied with assessed environmental standards on all sampled occasions since 2010, with the exception of 2021 and 2025 (Figure 2-1). The site lay fallow in 2007, 2008 and 2009.

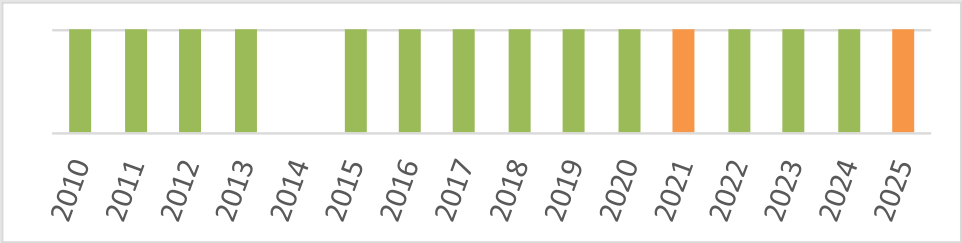

Figure 2-1 Historical outcomes of the Benthic Audits for Deenish site (green=acceptable, orange=not acceptable).

The contributing factor to the not acceptable status in 2021 was the presence of bacterial mat (due to organic enrichment) which was greater than 50% of the (sampled) area under and close to the pens. In the 2025 survey, bacterial mat was greater than 50% of the (sampled) area under and close to the pens - excess feed under and at the edge of the cage was also reported. The overall assessment in 2025 concluded 'Not acceptable' due to the presence of excess feed and bacterial mat >50% under and at the edge of the cage. Organic matter (measured as % Loss On Ignition (LOI), inside and outside the AZE was above the acceptable thresholds. Bacterial mats are a visual indicator of organic enrichment at the location. %LOI is a measure of organic matter content in the sediment. There were visible feed pellets present in the sample under and at the edge of the pens in both not acceptable surveys. The benthic impacts observed were attributed to organic deposition during that current production cycle, and likely linked to excess feed inputs. Biomass at the site, as reported in the benthic reports provided, is detailed in Table 2-1.

[21] Johannessen, P.J., Botnen, H.B. & Tvedten, O.F. (1994). Macrobenthos: before, during and after a fish farm. Aquaculture Research, 25(1), 55–66.
[22] Kutti, T., Ervik, A. & Hansen, P.K. (2007). Effects of organic effluents from a salmon farm on a fjord system. I. Vertical export and dispersal processes. Aquaculture, 262(2-4), 367–381.
[23] N.B. Keeley, C.J. Cromey, E.O. Goodwin, M.T. Gibbs, C.M. Macleod. 2013. Predictive depositional modelling (DEPOMOD) of the interactive effect of current flow and resuspension on ecological impacts beneath salmon farms. Aquaculture Environment Interactions, 3, pp. 275-291.
[24] Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring Link

Table 2-1 Details of stocking in relation to benthic monitoring at Deenish.

Reporting year	Tonnage reported (t)	Status	Stage in stocking cycle	Fallow period (weeks)
2018	1,533	Acceptable	Harvest	0
2019	345	Acceptable	Input	8
2020	1,082	Acceptable	Harvest	0
2021	455	Not acceptable	Input	19
2022	1,454	Acceptable	Harvest	0
2023	556	Acceptable	Input	24
2024	2,186	Acceptable	Harvest	5
2025	2,112	Not acceptable	Harvest	1

Table 2-1 identifies that the 2021 not acceptable result at the site corresponded to the early stage of the production cycle, when the stock were typically smaller fish (smolts), and the tonnage would be comparatively low (455 t). There had been a 19 week (>4.5 months) fallow period before fish inputs. An analysis of the samples reported indicate excess feed material, from the pens, being observed on the seabed in the samples under the pens, and to a lesser extent in the samples at the edge of the pens, with none in the samples at 10m and beyond. The 2025 not-acceptable result corresponds to the end of a harvest period, where there would have been near peak stock on site in the weeks prior, and was also attributed to excess feed material.

The organic material identified in these samples is a result of excess feed found on the seafloor. This would suggest that the impacts were likely a result of a transient issue, possibly husbandry or food quality related, rather than a more chronic event. Accumulation of food pellets on the seabed contributes to the organic pressures and should be avoided – it is recommended that operators have procedures in place to ensure the responsible utilisation of feed products to minimise wastage and excess organic pressures on the external environment. At the time of writing of this document, a remediation plan (BAP) is in place to address *the Not acceptable* status in 2025.

Current licensing regulates benthic effects in terms of a Zone of Maximum effect (ZME) and an Allowable zone of effect (AZE). The ZME will extend to 20 m from the edge of the pen and the AZE will extend to 100 m, unless otherwise defined. The ZME boundary delineates the area of seabed adjacent to the pens within which appreciable effects of organic enrichment are accepted, impacts should be reducing with distance from the pens. The AZE boundary delineates the boundary of measurable organic enrichment effects around and attributable to the site. These are laid out in *Monitoring Protocol No.1 for Offshore Finfish Farms Benthic Monitoring* and the size of the zone is determined on an individual site basis. While an effect is allowable, it is expected that even at the pen-edge, and underneath, some invertebrates are to be found to bioturbate. There is evidence, from the benthic reports submitted, of bioturbation of the sediment at most of the sample locations. As the impacts

are localised, disturbance experienced will be temporary with the species characterising the community types recovering to pre-disturbed state following cessation of activities[25]. Spatial overlap with any marine community type at this site is <1%. The *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* provides for instances where a sites receives a Not Acceptable assessment - in such cases a benthic amelioration plan would be activated which will agree the steps necessary to remedy the situation. This could include specifying husbandry and fallowing requirements.

Protocol for *Fallowing at Offshore Fin Fish Farms*[26] requires sites to fallow for a minimum 30 continuous days at the end of each production cycle. The primary aim of this fallowing is for the control of disease and parasite populations. Whilst benthic recovery is not the objective, this fallow period also serves to, in some way, mitigate benthic impacts by providing a break in the organic inputs, and a period to assist recovery. This site practises a fallow period in the region of 2 month (this is stated as 3 in cases within the documents and the graphic indicated Dec, Jan and Feb as being fallow months, but considering the variability in harvest completion and stock input dates, this report uses 2 months as the fallow period), which is beneficial to assist benthic recovery. Full recovery of a benthic community post disturbance can vary considerably in duration and may be a lengthy process (from months to years depending on extent)[27].

The seabed in the proposed site is uniformly flat and is characterised by predominantly fine and medium sands, with proportions of coarse shell fragments, along with reef in the north third of the site. The depth at the site ranges between 20m to 30m. Mean current speed at the site is reported at 30 cm/sec in a prevailing north-south direction. The community types present are primarily *Coarse sediment dominated by polychaetes community complex* with some *Laminaria-dominated community complex*[28]in reef areas. These benthic communities are considered somewhat tolerant to the pressures (i.e., organic enrichment) from the proposed activities[29,30]. Potential pressures from the activity are likely to be directly related to the volume and duration of production at the site. With a proposed increase in production tonnage, there will be an increase in potential pressures and hence impact on the seafloor.

Cleaner fish are used as a biosecurity measure and generally stocked at a rate of 5 to 7 fish per 100 salmon, by number. At the Deenish site there are plans to input 650,000 salmon smolts, which implies

[25] Niemi, G.J., DeVore, P., Detenbeck, N. et al. Overview of case studies on recovery of aquatic systems from disturbance. Environmental Management 14, 571–587 (1990).
[26] Protocol for Fallowing at Offshore Fin Fish Farms Link
[27] Keeley N, Valdemarsen T, Woodcock S, Holmer M, Husa V, R Bannister. 2019. Resilience of dynamic coastal benthic ecosystems in response to large-scale finfish farming. Aquacult Environ Interact, 11, pp. 161-179
[28] NPWS (2013) Conservation Objectives: Kenmare River SAC 002158. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
[29] Tools for AA of fishing and aquaculture activities in marine and coastal Natura 2000 sites (I to VIII) Link
[30] The Marine Life Information Network Link

45,500 cleaner fish could be stocked. Fish used range in size from 15g to 300g, with most being less than 100g. Assuming an average of 100g per cleaner fish, stocked at a rate of 7 per 100, would suggest 45,500 fish, which equates to 4,550 kg of cleaner fish, or 4.6 tonnes. Fed, a maintenance diet, at 2% of body weight per day, would suggest a maximum food input of 91kg per day. This equates to just under 34 tonne per year of cleaner fish food. This assumes the fish are fully stocked and fed all year through, which is not likely. This site plans to feed 342 tonne of salmon food per month at peak, and 3,285.1 tonne per year, so cleaner fish food would add ~1% to this at a very conservative max estimate, this is likely to be significantly lower. Considering the size of the cleaner fish and quantity of inputs, there is not likely to be a significant contribution to the modelled inputs from this source.

Four of the Aids to Navigation (AtoNs) at the site are independently anchored. Anchoring of all types of moorings will cause physical loss and change of habitat in the direct footprint of the moorings (i.e. smothering). This pressure will continue for the entire length of time the structure is in place, but the anchor may become embedded and submerged beneath sediment in cases. For this assessment, we assume that that time is the entire length of the aquaculture license. Abrasion could also occur from the subtidal moorings where the chain, shackle or rope could make contact with the seabed. For AToNs, the footprint will be the size of the mooring block or anchor. Given this small footprint, likely significant effects from physical loss or change of habitat on QIs or MCTs will be very local with negligible impact and can be ruled out.

Overall Conclusion

Considering the spatial extent of the site, the resilience of the community types present, the likely localised impacts of the activity, and that, subject to monitoring at the site, a functioning benthic community is to be retained outside and throughout the footprint of the site, full recovery from any disturbance can be expected to be achieved with cessation of activities.

On-going monitoring based on *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* is recommended to monitor pressure on the communities and to assess potential impacts that could arise from the on-going operations at the site and to manage activities such that any impacts are contained within a clearly defined area. The *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* provides for instances where a sites has a Not Acceptable assessment, based on an agreed benthic amelioration plan (BAP). If this application is permitted, adherence to this Protocol by the applicant should be a requirement.

Feed accumulation on the seabed contributes to the organic pressures and should be avoided – it is recommended that, should the proposal be consented, that the operators have procedures in

place to ensure the responsible utilisation of feed products to minimise wastage and excess organic pressures on the external environment.

Permitting of the applied for MAB should be subject to favourable monitoring results such that impacts are within allowable levels in terms of benthic community effects and spatial extent. Benthic monitoring should be carried out to assess the impact of activities on the seabed. *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* provides a requirement and a methodology for such monitoring tied to environmental quality standards with which to assess the findings, specifying zones beyond which impacts are not tolerated – and specifies adaptive management measures to address issues if they arise (see Section 2.4.1).

2.3.3 Marine Mammals

Records of seal, whale and dolphin species in the adjacent waters have been identified by the applicant. Relevant protected sites for each of the pinniped species (seals) are identified, based on the reported furthest foraging range for each species. Information on the occurrence of individual cetacean species (whales and dolphins) in the area is provided.

Impacts on pinnipeds are identified disturbance and entanglement, while disturbance, entanglement, and noise and vibration impacts on cetaceans are outlined.

2.3.3.1 Applicant Conclusion

The likelihood of impacts occurring is remote; it is concluded that there will be no significant effects to pinniped or cetacean species.

2.3.3.1.1 MI Supplemental

A *Risk Assessment for Annex IV Species - Intensive Aquaculture Deenish, Kenmare Bay (T06/202)* (Sept. 2023) report was carried out, which includes the assessment of risk from the project to Dolphins, Whales and Porpoises. This report concludes that *the proposed activities pose no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced, for the Annex IV species which occur in Ireland and its waters*. An A*ppropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175])* report was also conducted which concludes that *the potential for impact from the listed hazards is generally unlikely or of low intensity. While there may be some changes present in the environment, they are not likely to be significant, and impact on dolphins, whales and porpoises can be ruled out*.

Acoustic deterrent devices (ADDs), using various different conventional mechanisms (varying sound quality, signal types, duty cycles, etc.), have historically been utilised as a solution to managing

pinniped predation at some fish farm sites. Studies investigating conventional ADDs have identified them as a conservation concern due to noise pollution and long-term impacts on both target and non-target species[31]. Todd *et al* (2021)[32] found that, depending on operational characteristics, ADDs were predicted to cause auditory impact to (very high frequency) cetaceans (e.g. harbour porpoise) at ranges of 4–31 km. This was dependant on the source level of the ADD. Findlay et al (2024)[33] found that harbour porpoises are either displaced from habitats degraded by intense ADD noise and/or echolocate less.

The applicant states that "*As ADDs have never been required at the licenced site, it is extremely unlikely that they will be required if the licence is renewed*." Considering the likely impact to non-target species from their use, it would be advisable to prohibit the use of ADDs as a control measure.

AtoN markers have a lighting system to aid navigation which may pose a visual disturbance to species foraging at night-time. Fully marine mammals and cetaceans species are unlikely to be affected due to the size of, intensity, and that navigational lighting has not been documented to cause harm, therefore, given its very targeted range (directional and broadly parallel with the surface of the water), the AtoNs are unlikely to pose a risk. The small footprint and minor likelihood for interaction means the ATNs do not pose an barrier to movement or significant risk to animal species.

Conclusion

Following the conclusions from the risk assessment and the appropriate assessment processes, it can be concluded that there are not likely to be significant risks to marine mammals from this proposed project.

It is recommended that the use of Acoustic Deterrent Devices (ADDs) as a potential predator control measure be prohibited, due to potential impact on non-target species.

2.3.4 Otter

General otter behaviour is described, supported by literature references in the EIAR (Vol. 2 - Section 6.4).

[31] Gordon J & SP Northridge. 2002. Potential impacts of acoustic deterrent devices on Scottish marine wildlife. F01AA404, Scottish Natural Heritage. 63 pp.

[32] Todd VLG, Williamson LD, Jiang J, Cox SE, Todd IB & Ruffert M. 2021. Prediction of marine mammal auditory-impact risk from Acoustic Deterrent Devices used in Scottish aquaculture.Mar. Pollut. Bull., 165 , pp. 1-13

[33] Findlay CR, Coomber FG, Dudley R, Bland L, Calderan SV, Hartny-Mills L, Leaper R, Tougaard J, Merchant ND, Risch D & Wilson B. 2024. Harbour porpoises respond to chronic acoustic deterrent device noise from aquaculture, Biological Conservation, Volume 293.

2.3.4.1 Applicant Conclusion

The applicant EIAR concludes that the likelihood of an impact occurring on otters is remote, the consequence of an impact, if realised, is negligible; it is, therefore, concluded that there will be no significant effects to otter.

2.3.4.1.1 MI Supplemental

A *Risk Assessment for Annex IV Species - Intensive Aquaculture Deenish, Kenmare Bay (T06/202)* (Sept. 2023) report was carried out, which includes the assessment of risk from the project to otter. This report concludes that *the proposed activities pose no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced, for the Annex IV species which occur in Ireland and its waters*. An *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]* report was also conducted which considered otter separately. This report concludes that the *proposed application is considered non-disturbing to Otter (Lutra lutra) [1355] and there will be no adverse effect to this conservation feature.*

Conclusion

Following the conclusions from the Annex IV Risk Assessment and the Appropriate Assessment report, it can be concluded that there are not likely to be significant risks to otter from this proposed project.

2.3.5 Commercial Fish

2.3.5.1 Commercial species

The presence of commercial fish species in the licence application area is described as; "Six species use the Kenmare Bay region as a nursery area, these include cod, herring, mackerel, horse mackerel, white belly angler monk and whiting. All nursery grounds, with the exception of herring, overlap with the proposed aquaculture renewal site. Kenmare Bay also have the presence of adult herring, mackerel, megrim, hake, whiting, haddock, monkfish, Atlantic cod, blue whiting, horse mackerel and Atlantic salmon".

2.3.5.1.1 Applicant Conclusion

The applicant does not make any statements as to the potential effects of the proposed licence on commercial fish species.

2.3.5.1.2 MI Supplemental

It is likely that other commercial species of shellfish such as lobster, crab and shrimp occur in the area. A wild fisheries review is elaborated in the Appropriate Assessment report, considering the impacts of

this proposed site (and in combination with other proposed finfish sites in the area) which concludes that significant effects on commercial fish species can be discounted.

Conclusion

Given the location close to Deenish Island (terrestrial habitat) in addition to limited geographic area of the licence application in addition to any subsequent dispersal effects when compared to the very wide distributional extents of commercial fish, significant effects on commercial fish species are not likely, should this proposal be permitted. No mitigation actions are proposed.

2.3.5.2 Salmonids

The EIAR details the receiving environment detailing the key salmonid rivers in the area and information on fisheries.

2.3.5.2.1 Sea Lice

The report provides background information on sea lice and detail on modelling of potential impacts, and modelling maps and outputs, along with an assessment based on modelling and literature, particularly ICES 2016[34].

2.3.5.2.1.1 Applicant Conclusion

The EIAR identifies that continuous weekly monitoring as well as coordinated treatment of all licenced sites within the bay, through the Single Bay Management Plan, will minimise any potential risk on wild salmonids; consequently, the applicant concluded that the proposed operations at the Deenish site will not result in significant effects to salmonids.

2.3.5.2.1.2 MI Supplemental

Wild Atlantic salmon populations from many North Atlantic rivers have declined over the last number of decades and while many of the issues and challenges related to the freshwater stage are known, the continuing population declines are thought to be heavily influenced by reduced marine survival coincident with a reduced body size (De Eyto *et al*., 2022[35], Vollset *et al*., 2022[36]). Several factors affecting marine survival have been proposed from increasing water temperatures (Almodóvar *et al*.,

[34] ICES. (2016). Report of the Workshop to address the NASCO request for advice on possible effects of salmonid aquaculture on wild Atlantic salmon populations in the North Atlantic (WKCULEF), 1–3 March 2016, Charlottenlund, Denmark. ICES CM 2016/ACOM:42, 44 p

[35] De Eyto E, Kelly S, Rogan G, French A, Cooney J, Murphy M, Nixon P, Hughes P, Sweeney D, McGinnity P, Dillane M & Poole R. 2022. Decadal trends in the migration phenology of diadromous fishes native to the Burrishoole Catchment, Ireland. Frontiers in Ecology and Evolution 10: 915854

[36] Vollset KW, Urdal K, Utne K, Thorstad EB, Saegrov H, Raunsgard A, Skagseth Ø, Lennox RJ, Østborg GM, Ugedal O, Jensen AJ, Bolstad GH & Fiske P. 2022. Ecological regime shift in the Northeast Atlantic Ocean revealed from the unprecedented reduction in marine growth of Atlantic salmon. Science Advances 8: eabk2542.

2019[37]), change in abundance of predators (Strøm *et al*., 2019[38]) and food webs (Tyldesley *et al*., 2024[39]), to illegal fishing (Dadswell *et al*., 2022[40]). Many of these factors can, in turn, be compounded by climate change. Furthermore, the Technical Expert Group on Salmon (TEGOS) which provide advice on the management of salmon stocks in Ireland illustrate in their annual reports the range of factors which individually and synergistically affect marine survival, of which parasites/disease are one (TEGOS, 2024[41]). To investigate the potential effect of sea lice (*Lepeophtheirus salmonis*) on Atlantic salmon survival, randomised control trial (RCT) studies have been performed in Ireland. These trials use releases of hatchery-raised Atlantic salmon smolts, half of which were treated against sea lice using an antiparasitic medicinal product. The results have shown that sea lice can have a negative effect on survival, although the impact is highly variable and relatively small compared to the overall variation in marine survival[42,43, 44,45,46].

In recognition of the potential impact of sea lice on wild salmonids, the Irish Government instigated the National Sea Lice Monitoring Programme in 1991. The Marine Institute is the Agency responsible for implementing this programme. Over the period since implementation, the monitoring programme has been refined and formalised through the DAFM *Monitoring Protocol No. 3 in 2000* and the publication of the strategy for improved pest control in 2008[47]. All active marine finfish farms are inspected 14 times per year, on a fortnightly basis from March to May and monthly from June to February (with December and January combined as one period). Inspection results are circulated monthly to stakeholders and all the data is published in an annual report (see D'Arcy *et al*., 2025[48]).

[37] Almodóvar, A, Ayllón D, Nicola GG, Jonsson B & Elvira B. 2019. Climate-driven biophysical changes in feeding and breeding environments explain the decline of southernmost European Atlantic salmon populations. Canadian Journal of Fisheries and Aquatic Sciences 76: 1581-1595.

[38] Strøm JF, Rikardsen AH, Campana SE, Righton D, Carr J, Aarestrup K, Stokesbury MJW, Gargar P, Caballero Javierre & Thorstad EB. 2019. Ocean predation and mortality of adult Atlantic salmon. Scientific Reports 9: 7890.

[39] Tyldesley E, Banas NS, Diack G, Kennedy R, Gillson J, Johns DG & Bull C. 2024. Patterns of declining zooplankton energy in the northeast Atlantic as an indicator for marine survival of Atlantic salmon. ICES Journal of Marine Science 81: 1164-1184.

[40] Dadswell M, Spares A, Reader J, McLean M, McDermott T, Samways K & Lilly J. 2022. The decline and impending collapse of the Atlantic salmon (Salmo salar) population in the North Atlantic Ocean: a review of possible causes. Reviews in Fisheries Science & Aquaculture 30: 215-258.

[41] TEGOS. 2024. The status of Irish salmon stocks in 2023 with catch advice for 2024. Report of the Technical Expert Group on Salmon to the North-South Standing Scientific Committee for Inland Fisheries

[42] Jackson D, Cotter D, O Maoileidigh N, O Donohoe P, White J, Kane F, Kelly S, McDermott T, McEvoy S, Drumm A, Cullen A & Rogan G. 2011. An evaluation of the impact of early infestation with the salmon louse *Lepoephtheirus salmonis* on the subsequent survival of outwardly migrating Atlantic salmon, *Salmo salar* L., smolts. Aquaculture 320: 159-163.

[43] Gargan PG, Forde G, Hazon N, Russell DJF & Todd CD. 2012. Evidence for sea lice-induced marine mortality of Atlantic salmon (*Salmo salar*) in western Ireland from experimental releases of ranched smolts treated with emamectin benzoate. Canadian Journal of Fisheries & Aquatic Sciences 69: 343-353.

[44] Jackson D, Cotter D, Newell J, McEvoy S, O Donohoe P, Kane F, McDermott T, Kelly S & Drumm A. 2013. Impact of *Lepeophtheirus salmonis* infestations on migrating Atlantic salmon, *Salmo salar* L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality. Journal of Fish Diseases 36: 273-281.

[45] Krkosek M, Revie CW, Gargan PG, Skilbrei OT, Finstad B & Todd CD. 2013. Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean. Proceedings of the Royal Society B 280: 20122359.

[46] Gargan PG, Millane M, Lennox RJ & Vollset KW. 2025. Salmon lice from aquaculture reduce marine survival of Atlantic salmon. Journal of Animal Ecology 94: 1346-1360.

[47] https://www.gov.ie/en/publication/fcd20-aquaculture-foreshore-management/#sea-lice-control-strategy

[48] D'Arcy J, Kelly S, McDermott T, Power A, O'Donohoe P & Ruane N., 2025. National survey of sea lice (Lepeophtheirus salmonis Krøyer and Caligus elongatus Nordmann) on fish farms in Ireland – 2024. Irish Fisheries Bulletin No. 56, Marine Institute, Ireland. http://hdl.handle.net/10793/2022

Following an inspection, should salmon lice levels be above prescribed trigger levels, a notice to treat (NTT) is issued advising the farm to act in order to reduce their salmon lice levels. A follow up inspection is then arranged to determine the efficacy of such action and whether further action is required.

Following expiration of the licence in 2007 until 2010, the Deenish site was fallow and not considered active. Production has been carried out at the site from 2010 and has since been subject to continuous sea-lice monitoring. A review of 15 years of data at the site (Figure 2-2), demonstrates that salmon lice levels measured at the Deenish site have consistently been below the trigger levels and therefore, no NTT's have been issued. The graph also illustrates that the levels of ovigerous female salmon lice since 2010 have been below 0.5 per fish, below the figure of 1 per fish used in the modelling simulations (elaborated in Section 6.5.3.2) in the applicant's Environmental Impact Assessment report.

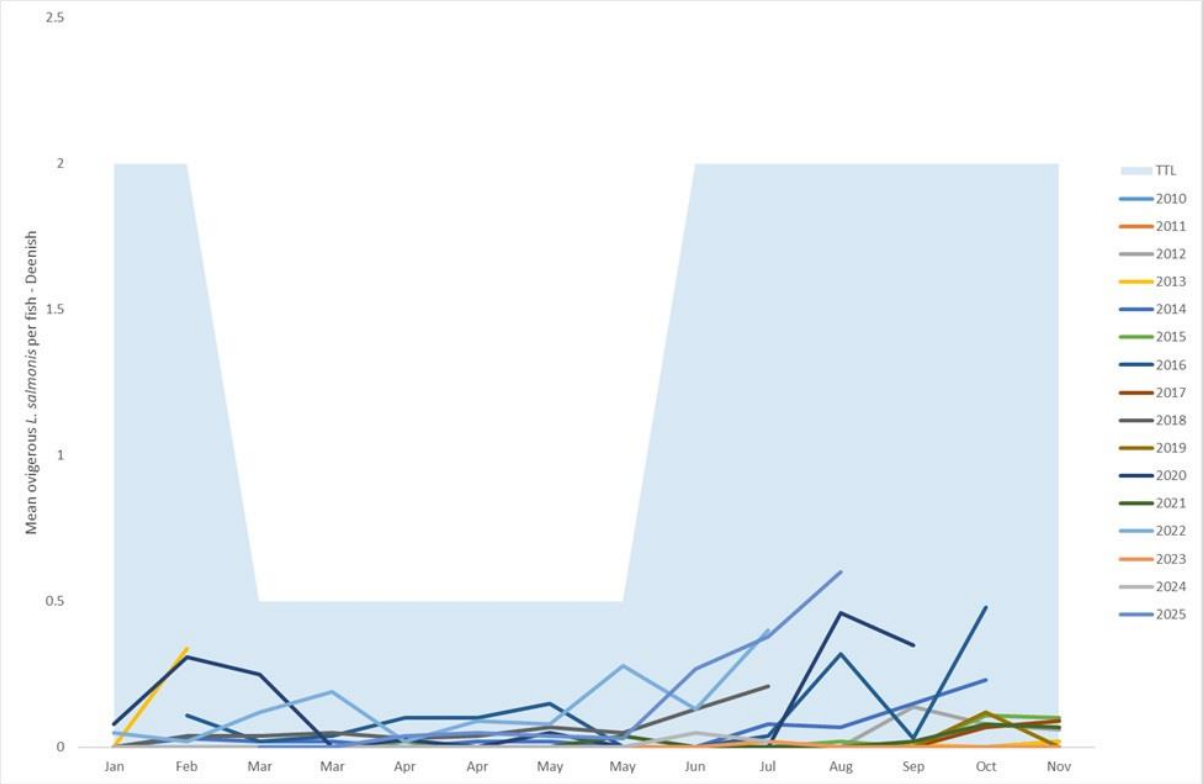

Figure 2-2 Mean ovigerous *L. salmonis* levels per fish at the Deenish site (2010 – 2025). Data taken from the national sea lice monitoring programme and trigger levels (TTL) are indicated by the shaded area.

Following advice from the International Council for the Exploration of the Seas (ICES) and the North Atlantic Salmon Conservation Organisation (NASCO), Irish Atlantic salmon stocks have been managed on a river-by-river basis since 2007 with biological reference points (BRPs) or conservation limits (CL)

based on maximum sustainable yield (MSY) (TEGOS 2025[49], Ó Maoiléidigh *et al*., 2004[50], White *et al*., 2016[51]). Independent scientific advice on the status of Irish salmon stocks and catch advice, for 144 designated salmon rivers, is provided by the TEGOS and its parent body, the cross-border North South Standing Scientific Committee on Inland Fisheries (NSSSCIF)[52]. Several sources of information are used in the annual catch advice process, such as data from the wild salmon tagging scheme[53], fish counter and trap data[54] and electrofishing surveys[55]. Each river has an individual CL which is the number of adult salmon required to maintain a healthy population of wild Atlantic salmon. Rivers with estimated returns meeting or exceeding the CL with a 75% probability are open for exploitation by salmon angling. Where river CL attainment probabilities are between 50 – 75%, rivers may be open to catch and release fisheries (White *et al*., 2023[56]). Rivers below 50% of CL are closed unless catchment wide electro-fishing surveys showing an average number of fry caught in 5 minutes of ≥ 17 warrants the opening of rivers on a catch and release basis only[57].

Of the 144 designated salmon rivers, there are 23 rivers located broadly in the vicinity of T06-202A site, between Kenmare Bay, Ballinskelligs, Valentia Bay and Castlemaine Harbour. The current status of these rivers in relation to their CL, is shown below in Table 2-2. Of the 23 rivers, 8 are open for angling, a further 4 rivers are open on a catch and release (C&R) basis only, and 11 are closed.

Table 2-2 The current status of designated Atlantic salmon rivers in the vicinity of T06-202, relative to conservation limit (CL) for the 2025 advice.

River	Fishery District	2025 CL status	Proportion of CL achieved	**CWEF** (catchment wide electrofishing)
Kealincha	Kenmare Bay	Closed		0
Lough Fada		Closed		1.6
Croanshagh		C&R	0.69	31
Owenshagh		Closed		13.4

[49] TEGOS, 2025. Appendix V River stock specific information used in the salmon catch advice process for 2025 advice. Report of the Technical Expert Group on Salmon to the North-South Standing Scientific Committee for Inland Fisheries, 86 pp.
[50] Ó Maoiléidigh N, McGinnity P, Prevost E, Potter ECE, Gargan P, Crozier WW, Mills P & Roche W. 2004. Application of pre-fishery abundance modelling and Bayesian hierarchical stock and recruitment analysis to the provision of precautionary catch advice for Irish salmon (Salmo salar L.) fisheries. ICES Journal of Marine Science 61: 1370-1378. https://doi.org/10.1016/j.icesjms.2004.08.014
[51] White J, Ó Maoiléidigh N, Gargan P, de Eyto E, Chaput G, Roche W, McGinnity P, Crozier WW, Boylan P, Doherty D, O'Higgins K, Kennedy B, Lawler I, Lyons D & Marnell F. 2016. Incorporating natural variability in biological reference points and population dynamics into management of Atlantic salmon (Salmo salar L.) stocks returning to home waters. ICES Journal of Marine Science 73: 1513-1524. https://doi.org/10.1093/icesjms/fsw015
[52] TEGOS, 2025. The status of Irish salmon stocks in 2024 with catch advice for 2025. Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries, 60 pp.
[53] IFI, 2024. Wild salmon and sea trout statistics report 2023. Inland Fisheries Ireland, Report IFI/2024/1-4692.
[54] IFI, 2025. IFI consolidated fish counter summary report 2024. Inland Fisheries Ireland, Report IFI/2025/1-4752.
[55] IFI, 2024. Report on salmon monitoring programmes 2023 funded under the salmon and sea trout rehabilitation, conservation and protection fund. Inland Fisheries Ireland, Report IFI/2024/1-4742.
[56] White J, Fitzgerald C, Gargan P, de Eyto E, Millane M, Chaput G, Boylan P, Crozier WW, Doherty D, Kennedy B, Lawler I, Lyons D, Marnell F, McGinnity P, O'Higgins K, Roche WK, Maxwell H & Ó Maoiléidigh N. 2023. Incorporating conservation limit variability and stock risk assessment in precautionary salmon catch advice at the river scale. ICES Journal of Marine Science 80: 803-822. https://doi.org/10.1093/icesjms/fsad006
[57] TEGOS, 2025. The status of Irish salmon stocks in 2024 with catch advice for 2025. Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries, 60 pp.

Cloonee		C&R		29.5
Sheen		Open	1.13	
Roughty		Open	1.12	
Finnihy		Closed		36
Kerry Blackwater		Open	1.18	
Sneem		Open	1.51	
Owreagh		Closed		8
Waterville (Finglas)	Ballinskelligs	Open	3.00 (1SW); 1.96 (2SW)	
Inny		C&R	0.96	22.1
Emlaghmore		Closed		3.7
Carhan	Valentia Bay	Closed		11
Ferta		C&R	1.01	
Behy	Castlemaine	Closed		6.8
Caragh		Open	3.00 (1SW); 1.53 (2SW)	
Laune and Cottoners		Open	2.30 (1SW); 1.23 (2SW)	
Maine		Open	1.26	
Emlagh		Closed		5.1
Owenascaul		Closed		13.9
Milltown		Closed		14.2

The historical status of each of these rivers (i.e. open for angling with a harvestable surplus (O), catch and release only (R) or closed (C)), since assessments began in 2007 is shown in Table 2-3 below. In 2007, of the 23 rivers assessed by the TEGOS, 30% were open for angling (6 were open and 1 was catch and release) and 70% (16 rivers) were closed. This compares with 52% open and 48% closed based on the latest published assessments, indicating that there has been a gradual improvement in the status of the rivers since that time.

Table 2-3 The status of designated Atlantic salmon rivers assessed, in the vicinity of T06-202 since 2007.

River	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O = open for angling; R = catch and release only; C = closed for angling																			
Kenmare Bay																			
Kealincha	C	C	C	C	R	R	R	C	C	C	C	C	C	C	C	C	C	C	C
Lough Fada	C	C	C	C	R	R	R	C	C	C	C	C	C	C	C	C	C	C	C
Croanshagh	C	R	R	O	O	O	O	O	R	O	O	O	O	O	O	O	O	R	R
Owenshagh	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Cloonee	C	C	C	C	C	C	R	R	R	R	R	R	R	R	R	R	R	R	R
Sheen	C	O	O	O	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O
Roughty	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Finnihy	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Kerry Blackwater	O	O	O	O	O	O	R	R	R	R	R	R	R	R	R	R	R	R	O

Sneem	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Owenreagh	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Ballinskelligs																			
Waterville (Currane)	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Inny	C	R	O	O	O	O	O	O	O	O	R	R	R	R	O	R	R	R	R
Emlaghmore	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Valentia																			
Carhan	C	R	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Ferta	C	R	C	O	O	R	R	O	O	O	R	O	O	O	O	O	O	O	R
Castlemaine																			
Behy	C	R	C	C	R	R	C	C	C	C	C	C	C	C	C	C	C	C	C
Caragh	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Laune & Cottoners	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Maine	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Emlagh	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Owenascaul	C	C	C	R	R	R	R	R	R	R	R	R	R	R	R	R	C	C	C
Milltown	C	C	C	C	R	R	R	R	R	C	C	C	R	R	R	R	C	C	C

Brown trout are a facultative anadromous fish species with a resident form remaining in freshwater and an anadromous form (sea trout) that migrates to brackish or marine environments before returning to freshwater. Offspring of sea trout and resident brown trout may show different life histories to their parents although it is believed that there is a genetic basis to anadromy (Ferguson *et al*., 2019[58]). Sea trout display extensive plasticity in marine migratory behaviour such as the timing of out-migration, marine residence duration, and migration distance. While anadromy may lead to better feeding opportunities it can be balanced by reduced survival due to a number of factors such as climate change, fisheries and aquaculture, and environmental degradation (Nevoux *et al*., 2019[59]).

The Waterville system (Waterville River and Lough Currane) is an important sea trout fishery in Ireland. Following reports of very poor rod catches in 1992 and 1993, the Department of Marine & Natural Resources (Engineering Division), the Marine Institute and the South Western Regional Fisheries Board funded the installation of a fish counter on the Waterville system. The results from the counter, at that time, indicated that there was a very good run of sea trout (30,000 to 40,000) into this system and that fears of a stock collapse similar to that which occurred in the West of Ireland could be discounted. Since that time, numbers have declined consistent with an overall decline in sea trout nationally. However, unlike Atlantic salmon, sea trout stocks are often data-limited and apart from a

[58] Ferguson A, Reed TE, Cross TF, McGinnity P & Prodöhl P. 2019. Anadromy, potamodromy and residency in brown trout Salmo trutta: the role of genes and the environment. Journal of Fish Biology 95: 692-718.

[59] Nevoux M, Finstad B, Davidsen JG, Finlay R, Josset Q, Poole R, Höjesjö J, Aarestrup K, Persson L, Tolvanen O & Jonsson B. 2019. Environmental influences of life history strategies in partial anadromous brown trout (Salmo trutta, Salmonidae). Fish and Fisheries 20: 1051-1082.

small number of index rivers, formal stock assessments for sea tout are rare (Shephard *et al*., 2019[60]). For the Waterville system, counter data for sea trout has been published annually since 2015 (Figure 2-3), with the exception of 2023 and 2024 due to issues with the counter[61].

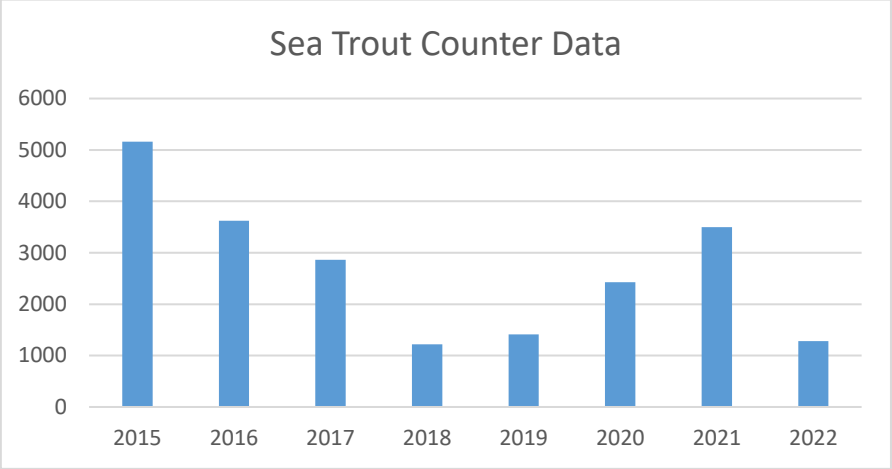

Figure 2-3 Sea trout counter data from the Waterville system (source Consolidated Fish Counter Summary Reports, Inland Fisheries Ireland).

Additional information can also be found from the rod catch data which indicates a decline in the catch since 2015, resulting in the cessation of rod catch harvesting (Figure 2-4).

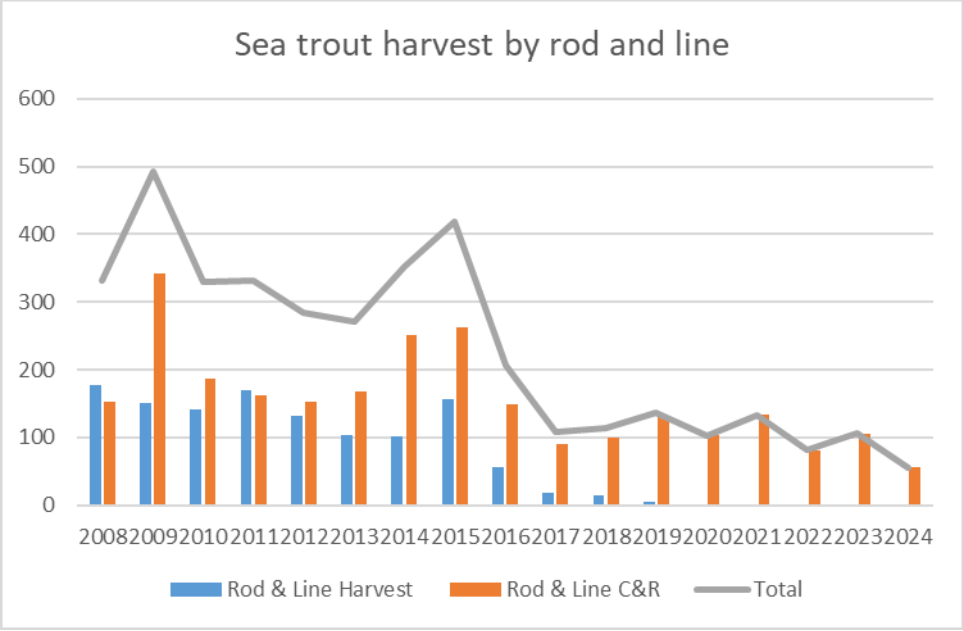

Figure 2-4 Sea trout rod catch data (harvest and catch & release (C&R) from the Waterville system 2008-2024 (source Wild Salmon and Sea Trout Statistics Reports, Inland Fisheries Ireland).

[60] Shephard S, Josset Q, Davidson I, Kennedy R, Magnusson K, Gargan PG, Walker AM & Poole R. 2019. Combining empirical indicators and expert knowledge for surveillance of data-limited sea trout stocks. Ecological Indicators 104: 96-106.
[61] IFI. 2025. Inland Fisheries Ireland Summary Fish Counter Report 2024. IFI/2025/1-4752.

Furthermore, it should be noted that classification of Lough Currane (IE_SW_21_457) under the Water Framework Directive (WFD) monitoring programme, as reported by the EPA in accordance with EC (water policy) regulation 2003 (SI no. 722/2003) [62] has shown a decline from high in the period of 2010-2015, Good from 2013-2018 to Moderate in the period 2016-2021 and increasing to Good from 2019-2024. The decline in the period 2015-2021 was attributable to Phytoplankton status. The historical WFD water quality results for Curraun (lake) are presented in Table 2-4.

Table 2-4 Historical WFD water quality status of Lake Curraun.

Period	2007-2009	2010-2012	2010-2015	2013-2018	2016-2021	2019-2024
Curraun (Lake)	Good	Good	High	Good	Moderate	Good

The salmon louse is a common parasite of wild Atlantic salmon and sea trout, and infestations have been reported in areas, with and without marine Atlantic salmon farming, around the coasts of Ireland (Copley *et al*., 2005[63]; Jackson *et al*., 2013[64]; Gargan *et al*., 2016[65]) and the UK (Tingley *et al*., 1997[66]; Todd *et al*., 2006[67]; Urquhart *et al*., 2008[68]; James *et al*., 2021[69]). There are reports that suggest infestations are higher in areas with marine aquaculture (Tully *et al*., 1999[70]; Gargan *et al*., 2003[71]; Middlemas *et al*., 2013[72]) although not all studies have shown this to be the case (Marshall, 2003[73]; Nekouei *et al*., 2018[74]; DFO, 2022[75]; van Nes *et al*., 2024[76]). Ecological monitoring programmes such as the monitoring of sea lice infestation levels on wild salmonids are challenging. The complex

[62] https://gis.epa.ie/EPAMaps and https://www.catchments.ie/data/#/dashboard/waterquality?_k=gxnevk
[63] Copley L, Tierney TD, Kane F, Naughton O, Kennedy S, O'Donohoe P, Jackson D & McGrath D. 2005. Sea lice, Lepeophtheirus salmonis and Caligus elongatus, levels on salmon returning to the west coast of Ireland, 2003. Journal of the Marine Biological Association of the UK 85: 87-92.
[64] Jackson D, Kane F, O'Donohoe P, McDermott T, Kelly S, Drumm A & Newell J. 2013. Sea lice levels on wild Atlantic salmon, Salmo salar L., returning to the coast of Ireland. Journal of Fish Diseases 36: 293-298.
[65] Gargan P, Karlsbakk E, Coyne J, Davies & Roche W. 2016. Sea lice (Lepeophtheirus salmonis and Caligus elongatus) infestation levels on sea trout (Salmo trutta L.) around the Irish Sea, an area without salmon aquaculture. ICES Journal of Marine Science 73: 2395-2407.
[66] Tingley GA, Ives MJ & Russell IC. 1997. The occurrence of lice on sea trout (Salmo trutta L.) captured in the sea off the East Anglian coast of England. ICES Journal of Marine Science 54: 1120-1128.
[67] Todd CD, Whyte BDM, MacLean JC & Walker AM. 2006. Ectoparasitic sea lice (Lepoephtheirus salmonis and Caligus elongatus) infestations of wild, adult, one sea-winter Atlantic salmon Salmo salar returning to Scotland. Marine Ecology Progress Series 328: 183-193.
[68] Urquhart K, Pert CC, Kilburn R, Fryer RJ & Bricknell IR. 2008. Prevalence, abundance, and distribution of Lepeophtheirus salmonis (Krøyer, 1837) and Caligus elongatus (Nordmann, 1832) on wild sea trout Salmo trutta L. ICES Journal of Marine Science 65: 171-173.
[69] James J, Bradley HA, Hillman R, Elsmere P, Reading AJ & Williams CF. 2021. Sea lice infections on wild Atlantic salmon and sea trout in the River Tamar, UK: a temporal study. Diseases of Aquatic Organisms 143: 119-127.
[70] Tully O, Gargan P, Poole WR & Whelan KF. 1999. Spatial and temporal variation in the infestation of sea trout (Salmo trutta L.) by the caligid copepod Lepeophtheirus salmonis (Krøyer) in relation to sources of infection in Ireland. Parasitology 119: 41-51.
[71] Gargan PG, Tully O & Poole WR. 2003. The relationship between sea lice infestation, sea lice production and sea trout survival in Ireland, 1992-2001. In Salmon At The Edge (D. Mills Ed.), Blackwell Publishing.
[72] Middlemas SJ, Fryer RJ, Tulett D & Armstrong JD. 2013. Relationship between sea lice levels on sea trout and fish farm activity in western Scotland. Fisheries Management and Ecology 20: 68-74.
[73] Marshall S. 2003. The incidence of sea lice infestations on wild sea trout compared to farmed salmon. Bulletin of the EAFP 23: 72-79.
[74] Nekouei O, Vanderstichel R, Thakur K, Arriagada G, Patanasatienkul T, Whittaker P, Milligan B, Stewardson L & Revie CW. 2018. Association between sea lice (Lepeophtheirus salmonis) infestation on Atlantic salmon farms and wild Pacific salmon in Muchalat Inlet, Canada. Scientific Reports 8: 4023.
[75] DFO. 2022. Association between sea lice from Atlantic salmon farms and sea lice infestations on wild juvenile Pacific salmon in British Columbia. Canadian Science Advisory Secretariat, Science Response 2022/045.
[76] Van Nes S, Imsland AKD & Jones SRM. 2025. Salmon lice biology, environmental factors, and smolt behaviour with implications for the Norwegian salmon farming management system: a critical review. Reviews in Aquaculture 17: e12953. https://doi.org/10.1111/raq.12953.
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interactions between host, parasite and the environment are not fully understood and the data collected must be sufficiently robust and precise in order to answer the underlying scientific questions (Helland *et al*., 2015[77]). In the case of wild salmonids (e.g. sea trout), obtaining a sample size sufficient for robust statistical analysis has been an ongoing issue with monitoring programmes (Cowx, 1997[78]; Poole *et al*., 2001[79]).

However, while uncertainties exist regarding the true impact of sea lice infestations, to sustain salmonid populations and to ensure a harvestable surplus for fisheries, sea lice levels on marine salmon farms need to be maintained as minimal as possible to reduce any potential negative effects on wild salmonid populations. The *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control* sets out a monitoring and control strategy based on prevention, monitoring, and intervention. This monitoring and control strategy includes specific trigger levels as an integral part of implementing a targeted control regime, where the farm is obliged to take remedial action should the pre-defined trigger levels be exceeded. The monitoring and control strategy outlined in this Protocol can be used to control potential impacts from sea lice.

Conclusion

Maintaining salmon lice levels as close to zero as practicable to minimise any potential negative effects on wild salmonid populations is required. Adherence to *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control*, should be a condition of any license that may be issued.

Adhere to the *Strategy for improved pest control on Irish salmon farms* as mandatory requirement, should a licence be granted.

Should this application be progressed, it is recommended that the following trigger levels be specified for this site:

- An average for the site of 0.5 ovigerous *Lepeophtheirus salmonis* females per fish during the critical Spring period of March to May (inclusive).
- An average for the site of 2.0 ovigerous *Lepeophtheirus salmonis* females per fish for the remainder of the year (June to February inclusive).

[77] Helland IP, Uglem I, Jansen PA, Diserud OH, Bjørn PA & Finstad B. 2015. Statistical and ecological challenges of monitoring parasitic salmon lice infestations in wild salmonid fish stocks. Aquaculture Environment Interactions 7: 267-280.
[78] Cowx IG. 1997. Sea trout monitoring programme independent evaluation. A report for the Sea Trout Monitoring & Advisory Group (STMAG), 62 pp.
[79] Poole R, O'Maoileidigh N, Jackson D, Gargan P & Keatinge M. 2001. Review of sea lice monitoring and sea trout/sea lice database. A report by the Marine Institute, Central Fisheries Board and the Salmon Research Agency, 24 pp.

- An average for the site of 10 total mobile *Lepeophtheirus salmonis* per fish, at all times - regardless of the number of ovigerous *Lepeophtheirus salmonis* per fish. Total mobiles consist of all pre-adult, adult male and adult female stages.

Detail on the monitoring and management plans should be specified in the *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control.*

2.3.5.2.2 Disease

Heath management on the proposed site is detailed as being conducted according to MOWI's '*Fish Health Management Plan*'. Details on the underpinning legislation, policies for disease treatment (including records), policies for parasite control (including records and treatments), policy for predator control, policy for mortalities, escapes, and farm management are provided.

2.3.5.2.2.1 Applicant Conclusion

According to the applicant, the use of vaccines and effective veterinary supervision have brought the eradication and control of diseases on salmon farms to a level that surpasses accepted levels for other livestock. In the applicant's view, any greater level of vigilance defeats the objectives of their business model. Given the control of diseases on the farm (see Section 2.12 for details), it is highly unlikely that the farm act as a significant source of disease; consequently, there will be no significant effects to wild salmonids.

2.3.5.2.2.2 MI Supplemental

Regulation (EU) 2016/429[80] of the European Parliament and of the Council on transmissible animal diseases ('Animal Health Law' (AHL)), is the European Regulation which sets out the legislative framework for the management and control of diseases of both terrestrial and aquatic animals in the EU. Although the AHL sets out certain measures which are specific to aquatic animals, and certain other measures which are specific to terrestrial animals, very many of the measures set out in that Regulation, apply to both terrestrial and aquatic animals. For example, requirements concerning veterinary intervention, disease investigation, notification and reporting, are broadly the same for the terrestrial species referred to by certain members of the public (pigs, calves), as they are for aquatic species.

Concerning Irelands health status, Annex II to the AHL sets out the list of diseases to which the Regulation applies. Four diseases of salmonids (Epizootic haematopoietic necrosis (EHN), viral haemorrhagic septicaemia (VHS), infectious haematopoietic necrosis (IHN) and infection with HPR-deleted ISAV) are listed in that Annex. The whole territory of Ireland is officially recognised as being

[80] OJ L 84, 31.3.2016, p.1.

free from all four of these diseases, which means that Ireland has one of the highest health statuses concerning listed diseases of aquatic animals, in the EU. In addition, Ireland has been granted national measures[81] for the salmonid diseases BKD and infection with *Gyrodactylus salaris* in accordance with Article 226 of the AHL, again, giving Ireland a superior health status when compared to most other EU Member States.

The high national health status referred to above, obviously also applies to the aquaculture establishment which is the subject of this application.

In accordance with the AHL, operators have significant responsibilities concerning the animals they keep and products they produce. Compliance with those responsibilities are checked when Veterinary Inspectors complete annual inspections on all marine finfish sites. Those inspections are carried out in accordance with the AHL, and also in accordance with Regulation (EU) 2017/625[82] ('Official Controls Regulation' (OCR)). Any non-compliances which are identified are notified to the operator, and must be closed out in an agreed time-frame. Some of the requirements that are checked during such inspections are the nature and frequency of veterinary interventions at the establishment, disease investigations commenced and completed, treatments administered, records kept, biosecurity measures in place. In the past 7 years, no non-compliances have been raised during the annual inspections referred to above, concerning the establishment which is the subject of this application.

In addition, in accordance with Recital (30) of the AHL, for transmissible animal diseases that are not subject to measures laid down at Union level, but which are of importance for the private sector at local level, the sector has, with the assistance of the competent authority and other State Agencies, taken action to prevent or control such diseases, through the development of a Code of Practice for Salmonid Aquaculture in Ireland and the associated Farmed Salmonid Health Handbook[83]. The Handbook covers best practices concerning fish health and welfare, environmental requirements, general husbandry and biosecurity measures and creates a framework for the prevention and control of both listed and non-listed diseases of salmonids. The Code of Practice and the Handbook were launched in 2011, and continue to be supported by the salmonid industry, including the applicant.

Concerning the matter of disease interactions between farmed and wild aquatic animals, the following general points are relevant:

- Salmon farming in Ireland is considered a biologically young sector, and so it is probably safe to assume that the diseases by which it is impacted have originated in wild populations of

[81] https://www.fishhealth.ie/fhu/about-us
[82] OJ L 95, 7.4.2017, p.1.
[83] Management of Non-listed Aquatic Diseases | Marine Institute

salmonids (this is in contrast to diseases which have co-evolved in humans and domesticated animals: Dazsak et al., 2000)[84].

- In all situations where animals are farmed intensively, be they terrestrial or aquatic, the prudent approach is to reduce the occurrence of disease in kept animals through good health management, proactive veterinary intervention, high biosecurity levels, and where possible, through vaccination. Such actions will minimise the spread of disease, both within and outside the establishment. This approach aligns with the fish health management measures which are proposed by the applicant.

Although there is a substantial amount of research outputs available concerning the general characteristics and impacts on diseases on salmonids, they largely relate to aquaculture stock (Eiras, 2008)[85]. The incidence of diseases in wild fish is, on the other hand, not extensively documented in the scientific literature. However, in a historical review of the key pathogens BKD, Furunculosis, IPN, ISAV, SAV and VHS in Scottish wild fish, Wallace et al. (2017)[86], concluded that despite the large number of samples taken over time, there is limited evidence for clinical disease in wild fish due to these pathogens (although BKD and Furunculosis historically occurred), and that they are likely to have had minimal impact on Scottish wild fish. This limited impact is comparable to the situation in Norway, where despite infection on farms, a review of published literature found that there is limited infection of wild fish with most viral and bacterial pathogens (Johansen et al., 2011)[87]. As a result, viral and bacterial diseases are assessed as low risk to wild fish (Taranger et al., 2015)[88].

Although such data are not available from Ireland, it could be reasonably expected that a similar situation exists here.

- Specifically, *concerning* the risk Amoebic Gill Disease might pose to wild salmonid stocks, in their response to the public consultation, the applicant has stated that they:
    - apply good husbandry and management practices under the supervision of a dedicated fish health team, which includes a veterinary practitioner; and
    - periodically bathe fish in freshwater to repair gill damage caused for marine amoeba, phytoplankton, zooplankton and jellyfish.

[84] Emerging Infectious Diseases of Wildlife-Threats to Biodiversity and human Health, Peter Daszak, Andrew Cunningham, Alex D.Hyatt, Science Vol 287 21 January, 2000.
[85] Eiras JC, Segner H, Wahli T, Kapoor GB: Fish diseases Volume 1 and 2. Science Publishers, Enfield, Jersey, Plymouth; 2008:1312. ISBN (set): 978-1-57808-438-8. ISBN (Vol. 1): 978-1-57808-527-9. ISBN (Vol. 2): 978-1-57808-528-6
[86] A historical review of the key bacterial and viral pathogens of Scottish wild fish, I.S. Wallace, P. McKay, A.G. Murray, Journal of Fish Diseases, 2017:1-16.
[87] Johansen L-H., Jensen, I., Mikkelsen, H., Bjorn, P.A., Jansen, P.A., & Bergh, O. (2011). Disease interaction and pathogen exchange between wild and farmed fish populations with special reference to Norway, Aquaculture, 315, 176-186.
[88] Taranger, G.L., Karlsen, O., Bannister, R.J., Glover, K.A., Husa, V., Karlsbakk, E., Svasand, T. (2015). Risk assessment of the environmental impact of Norwegian salmon farming. ICES Journal of Marine Science, 72,997-1021.

Whilst the objective of such practices and treatments is to protect the health and welfare status of the aquaculture animals in the establishment, strong veterinary supervision and appropriate treatments, will also serve to mitigate any potential impact on wild stocks, including any posed by *Neoparamoeba perurans*, the causative agent of AGD.

Concerning the impact of water temperatures, the applicant says that they have operated several farm sites along the coast of Ireland since 1979, with differing temperature profiles and have experience of a range of elevated summer temperatures over that period of operation. It seems reasonable to conclude therefore, that given the substantial investment required to operate a marine farm, the applicant would not jeopardise their investment if the risk associated with elevated water temperatures was deemed to be too great. The applicant further points out that wild salmon and sea trout are exposed to the same temperature profiles as farmed salmonids, and as such, are exposed to the same potential risks.

As part of site-level welfare and integrated pest management measures, cleaner fish are employed as a supplementary biological control to manage sea lice levels on marine Atlantic salmon farms. In Ireland, this includes the use of several wrasse species—**Ballan wrasse** (*Labrus bergylta*), **Goldsinny wrasse** (*Ctenolabrus rupestris*), **Corkwing wrasse** (*Symphodus melops*), **Rock cook wrasse** (*Centrolabrus exoletus*), and **Cuckoo wrasse** (*Labrus mixtus*)—as well as the **Lumpfish** (*Cyclopterus lumpus*). All species have been found to be efficient in the removal of sea lice from salmon and are being uses in sea pens.

The use of cleaner fish carries an inherent responsibility to ensure their health and welfare while on site. The *Farmed Salmonid Health Handbook* provides guidance on best practices for the sourcing, transport, handling, stocking, and general management of cleaner fish. As these species form an integral part of farm operations, it is considered best practice that they be maintained on a supplementary maintenance diet, and their management should comply with all relevant regulations and guidelines concerning health and welfare.

Conclusion

Regulation (EU) 2016/429 on transmissible animal diseases (Animal Health Law (AHL)) and its supplementing Regulations, set out the legislative framework within which aquaculture operators must deal with fish health matters generally, and with certain listed and emerging diseases. In Ireland, the application of those Regulations is applied in large part via the Fish Health Authorisation (FHA), which is granted to each aquaculture establishment, by the Marine Institute. The FHA is underpinned by a Fish Health Management Plan, which sets out details of how the operator deals

with requirements concerning disease surveillance, notification, traceability, biosecurity and record keeping, on the site to which the FHA applies.

Concerning the management of non-listed diseases, all salmonid farms are under veterinary supervision and voluntarily adhere to the Code of Practice for Salmonid Aquaculture in Ireland. This Code of Practice is supported by the Farmed Salmonid Health Handbook, which sets out technical standards, which reflect international best practice. Whilst the application of those technical standards is not audited by the State, the standards themselves are reflective of many of the provisions of the Organic Standards which apply in all finfish establishments in Ireland, and which are subject to regular audit by approved certification bodies.

Adherence to all relevant animal health regulations and application of Fish Health Authorisation should be a requirement if the licence is to be granted.

The use of veterinary medicinal products to treat or vaccinate aquaculture animals, should take place under veterinary supervision and in accordance with national and European legislation.

There is no evidence to suggest that the licensing of this establishment poses an unacceptable disease-risk to other aquaculture animals or to wild populations of salmonids or other fish species.

The use of cleaner fish (Ballan wrasse (*Labrus bergylta*); Goldsinny wrasse (*Ctenolabrus rupestris*); Corkwing wrasse (*Symphodus melops*); Rock cook wrasse (*Centrolabrus exoletus*); Cuckoo wrasse (*Labrus mixtus*); and/orLumpfish (*Cyclopterus lumpus*)) as biological controls carries an inherent responsibility to ensure their health and welfare while on site, and they should be maintained on a supplementary maintenance diet, and their management should comply with all relevant regulations and guidelines concerning health and welfare.

2.3.5.2.3 Therapeutants

2.3.5.2.3.1 Applicant Conclusion

Concerning veterinary medicinal products including those used to treat sea lice infestations, the applicant has concluded that the use of chemicals, including antibiotics, has been reduced with the introduction of vaccines and the application of organic standards. They have further stated that in-feed antibiotic treatments are never used prophylactically for farmed salmon.

2.3.5.2.3.2 MI Supplemental

In Ireland, veterinary medicinal products such as vaccines, antibiotics and antiparasitics are administered under veterinary supervision, and in compliance with relevant EU[89] and national legislation[90]. Vaccination against relevant diseases is part of the disease management strategy of the

[89] Regulation (EU) 2019/6 of the European Parliament and of the Council of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC

[90] SI 36 of 2022. European Union (Veterinary Medicinal Products and Medicated Feed) Regulations 2022

applicant, and this assists with decreasing infection pressure at various points throughout the life-cycle of the aquaculture animal, thereby ensuring good standards of animal health and welfare.

Conclusion

Aquaculture animals will be vaccinated against relevant diseases before they are stocked thereby ensuring the animals are immunologically well prepared for most disease challenges they will experience, post transfer. If further treatment, for example, with an antibiotic or antiparasitic, is required during their time at sea, the medicine will be prescribed by a veterinarian, and in accordance with national and European legislation, and the animals will remain under their care until the treatment has been completed. The use of such veterinary medicinal products does not therefore, present an obstacle to licensing this establishment.

2.3.5.2.4 Escapees

2.3.5.2.4.1 Applicant Conclusion

The EIAR provides an overview of the potential impacts of escaped farmed salmon on wild populations indicating that the long-term consequences of introgression can lead to changes in life-history traits, reduced population productivity and decreased resilience to future challenges[91]. The report states that the operator has an improved standardised pen, net and mooring design adopted on all farms. They have classified the Deenish site as having a high risk of susceptibility to storm damage based on the wave climate and hydrographic regime in the locality. The design and specifications (as detailed in Appendix 4) of the pens, mooring and anchors used at the site reflects this classification and mitigate against storm damage, reducing the risk.

The EIAR also states that no farmed escapes have been reported at the site since MOWI began operations. A fish escape prevention policy is in place (SOP 36708; EIAR Volume 3 Appendix 4) and the applicant follows the guidelines on containment of farmed salmonids, drawn up between the North Atlantic Salmon Organisation (NASCO) and the International Salmon Farmers Association (ISFA) [92]. A range of SOPs have been provided in the EIAR Volume 3 Appendix 2 on net inspections (SOP 28941), maintenance (SOP 28646) and net strength tests (SOP 33176) amongst others e.g. pen moorings.

2.3.5.2.4.2 MI Supplemental

Escapes of fish present both ecological and genetic risks. The primary concern is that they could adversely impact wild stocks, either through competition for food or habitat, disease, or through

[91] Glover et al., 2017. Half a century of genetic interaction between farmed and wild Atlantic salmon: status of knowledge and unanswered questions. Fish and Fisheries 18: 890-927. https://doi.org/10.1111/faf.12214

[92] NASCO. 2001. Guidelines on containment of farmed salmon. CNL(01)53

reproductive mixing resulting in genetic introgression (Glover *et al*., 2017[93]; Bradbury *et al*., 2020[94]). Typically, domesticated fish raised in captivity are poor performers and have low fitness in the wild[95]. Escapees quickly become prey to other predators, lessening their potential for food and habitat competition[96]. If farmed fish were to escape and interbreed with wild populations, there is the potential for negative genetic consequences for the mixed population, potentially lowering fitness and limiting the ability of the wild fish to respond to changing environmental conditions. These aspects have been considered adequately reviewed, by the applicant, in the EIAR Volume 2 Section 6.5.6.

A study in Scotland showed that signs of introgression were found in 23.2% of sites examined and that these were concentrated in areas of aquaculture production[97]. Similarly in Norway, indications of genetic introgression from escaped farmed salmon were found in almost 63% of rivers screened, with 28% of the rivers tested being classified as severely impacted (Anon., 2023[98]). Ireland has a much smaller production of farmed Atlantic salmon and information held by the Marine Institute since 2007 indicates that there have been no reports of farmed Atlantic salmon escapes from this site. Prior to that time, a study on the incidence of escaped farmed salmon in the United Kingdom and Ireland indicated that they occur at a low frequency of < 5% (Walker *et al*., 2006[99]). Baskett *et al* (2023)[100] states that long-term consequences of steady, low-level escapes are more detrimental than is the case if the same quantity escape in large numbers at rare intervals in time. Although minimizing the frequency of very large escape events such as net-pen loss in storms remains crucial, their results suggest that increasing efforts to monitor and prevent constant, low-level loss of stock from aquaculture operations deserves analogous consideration.

A more recent European-wide study on the causes of farmed finfish escapes from European aquaculture identified structural failure as a significant cause of fish escapes (Jackson *et al*., 2015[101]). Appropriate moorings and routine net monitoring and maintenance were identified as key factors

[93] Glover KA, Solberg MF, McGinnity P, Hindar K, Verspoor E, Coulson MW, Hansen MM, Araki H, Skaala Ø & Svåsand T. 2017. Half a century of genetic interaction between farmed and wild Atlantic salmon: Status of knowledge and unanswered questions. Fish and Fisheries 18: 890-927.

[94] Bradbury IR, Burgetz I, Coulson MW, Verspoor E, Gilbey J, Lehnert SJ, Kess T, Cross TF, Vasemägi A, Solberg MF, Fleming IA & McGinnity P. 2020. Beyond hybridization: the genetic impacts of non-reproductive ecological interactions of salmon aquaculture on wild populations. Aquaculture Environment Interactions 12: 429-445.

[95] Olsen, R., & Skilbrei, O. (2010). Feeding preference of recaptured Atlantic salmon Salmo salar following simulated escape from fish pens during autumn. Aquaculture Environment Interactions, 1, 167-174.

[96] Lp, H. (2006). Migration and survival of farmed Atlantic salmon (Salmo salar L.) released from two Norwegian fish farms. Ices Journal of Marine Science, 63, 1211-1217.

[97] Gilbey et al. 2021. A national assessment of the influence of farmed salmon escapes on the genetic integrity of wild Scottish Atlantic salmon populations. Scottish Marine and Freshwater Science 12

[98] Anon. 2023. Status of wild Atlantic salmon in Norway 2023. A report by the Norwegian Scientific Advisory Committee for Atlantic Salmon.

[99] Walker et al. 2006. Monitoring the incidence of escaped farmed Atlantic salmon, Salmo salar L., in rivers and fisheries of the United Kingdon and Ireland: current progress and recommendations for future programmes. ICES Journal of Marine Science 63: 1201-1210.

[100] Baskett ML, Burgess SC & Waples RS. 2013. Assessing strategies to minimize unintended fitness consequences of aquaculture on wild populations. Evolutionary Applications. pp 1090-1108.

[101] Jackson D, Drumm A, McEvoy S, Jensen Ø, Mendiola D, Gabiña G, Borg JA, Papageorgiou N, Karakassis Y & Black KD. 2015. A pan-European valuation of the extent, causes and cost of escape events from sea cage fish farming. Aquaculture 436: 21-16.

which could reduce the incidence of escapes. Advances in pen design, which includes robust pen structures, strong net material and improved mooring components, have dramatically reduced unintentional escapes. Maintenance and management practices, as detailed in the EIAR Vol. 2 Appendix 2, along with additional standard operating procedures outlined in Appendix 3 (predator control) and Appendix 4 (emergency plans) will aid in minimising the risk of large-scale escape events occurring. Strict adherence and regular training in routine husbandry operations as outlined in Appendix 2 will also ensure the risk of low-level escapes is minimised.

The wave modelling, that underlies the Section 8.1.3-Wave Climate, is fit for purpose. Model validation would have been desirable but probably not necessary in this case given that there have been operations at the site for some time, so the exposed nature of the site is known. The obvious conclusion from the modelling effort is that this a very exposed site. The fact the license renewal application is requesting an extension of the site boundary will mean that the pens could be more exposed than they were in the original site (especially to the north). It is noted that the wave modelling report only quotes Computed Design Wave Conditions (in Table 8.1) for the centre of the site (note that location given for the centre point in Table 8.1 is incorrect, but it is correct in the Appendix) rather than for a few locations covering the whole site.

Conclusion

The record of no reported escapes and the range of preventative measures and training SOPs already in place, leads to the conclusion that the likely occurrence of an escape event happening is low. The EIAR states that the equipment and mooring systems at the proposed site will be designed to withstand the predicted 50-year local wave conditions, and any granting of a license should be contingent on this.

Compliance with the *Protocol for Structural Design of Marine Finfish Farms* is recommended as a mandatory requirement, should the site be consented.

The licensee shall notify the Department of Agriculture, Food and the Marine, the Marine Institute and Inland Fisheries Ireland of a breach of containment immediately, and not more than 24 h, after becoming aware of the incident, and should keep records of the incident (fish number, type, origin, year-class).

2.3.6 Birds

The assessment of potential effects on birds focuses on species protected under the EU Birds Directive (Council Directive 2009/409/EEC) for which Special Protection Areas (SPAs) are designated. The assessment considers foraging range, disturbance risk, entanglement/mortality risk, impacts on foraging and the suitability of habitat in the licenced area. A risk assessment is carried out using the

criteria of risk of disturbance, population sensitivity, habitat suitability, and species habitat flexibility; with an assessment of impact significance.

2.3.6.1.1.1 Applicant Conclusion

The report concludes that the likelihood of impacts occurring is remote. It is concluded that there will be no significant effects.

2.3.6.1.1.2 MI Supplemental

An appropriate assessment screening report, *Report supporting the Appropriate Assessment Screening of Intensive Aquaculture (T06/202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]*, was carried out, which includes the assessment of risk from the SPA and protected bird species. This report screened in 18 species for further assessment and screened out all other species within the zone of influence of the project based on there being no likely significant effect on these species. The *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]* report considered these bird species and concludes that *the proposed activity will not significantly reduce the natural range available, or the size of habitat available, for the ornithological QIs and it will not hinder the ability of these QIs to maintain their populations as a viable component of the natural habitat on a long-term basis. There will therefore be no significant adverse effects on the conservation objectives for these ornithological QIs*.

Competition for prey resource with bird species may occur with the extraction of cleaner fish by fishery, from the environment. Wrasse species are a prey item of Cormorant, along with other species. Wrasse are used to control sea lice infestations on farmed salmon. The fishing for and management of wrasse on the salmon farm is described in the Annexes to the EIAR (Vol. 3). Protocols for fishing and welfare are described. Protocols for welfare of wrasse on the farm are described in detail and seem comprehensive and appropriate. Wrasse are only to be sourced from 6 regions/bays; north west and south west Donegal, Clew Bay, Connemara, Kenmare, and Bantry Bays for biosecurity reasons

No assessment of the effects of harvesting wrasse on wild populations is provided. The sensitivity of wrasse to fisheries is related to their life history parameters and reproductive strategies in particular. The records of fish movement (based on fish movement approvals from MI data) for the Deenish site are set out below, and demonstrate that the percentage of farmed cleaner fish used has increased from 0 % in 2021, to 100% to date, in 2024 (Table 2-5).

Table 2-5 Sources of cleaner fish in use at the Deenish site, and nationally in Ireland.

Deenish - Year	% Wild	% Farmed	National – Year	% Wild	% Farmed
2021	100	0	2021	42	58

2022	29	71	2022	36	64
2023	47	53	2023	33	67
2024	0	100	2024	27	73

It is the stated objective of the Applicant to source 100% of all cleaner fish from farmed supplies, and substantial progress has been made in a relatively short period of time towards this target. Indications are that this target can be achieved in the short term, as capacity increases, thereby mitigating any risks associated with these animals from an ecological (and a disease) perspective. Fishing of wrasse in not a regulated activity. Every effort should be made to stock with cleaner fish of aquaculture origin. Where this is not possible, and their use is necessary for sea lice control, wild cleaner fish should be locally sourced. Utilising natural management methods is preferable to reliance on chemical treatment methods.

Cormorant have high levels of flexibility in prey items and are unlikely to be impacted. The possibility of impacts on individual birds, from isolated entanglement events cannot be ruled out, but numbers are likely to be very low, and population level effects are not likely. However, more detailed quantification of events would be desirable to better ascertain impacts, and it is recommended that the operator report to the regulator any entanglement or mortality of birds (or mammals) as a result of the operation.

AtoNs with sub-tidal markers pose an entanglement risk to diving bird species. Ther visible rope and chains, and having taut mooring systems, reduces the chance of any significant risk. The lights may present a visual disturbance which can affect, particularly, nesting birds. Disorientation in Cory's Shearwater and Leaches Storm Petrel have been recorded[102], however impacts appear to predominately effect juveniles and numbers attracted are low - and light attraction is not a cause of high mortality[103]. Distance to the light source and intensity of the light is also a factor. The lights used have a 2 mile (3.2km) range. The lighting is yellow with a wavelength greater than 500 nanometres which is above the sensitive range for seabird species[104]. The lights are distributed across the 33 ha site. These low level, directed and shielded light sources are not of sufficient intensity or quantity to cause sky-glow, and are therefore not likely to cause significant attraction or effect on any sensitive species. Marker buoys may act as a perching site for birds, primarily species such as Cormorant or Shag. This will have a positive or neutral effect on bird SCIs. They can also act as fish aggregating

[102] Miles, Will, Sarah Money, Richard Luxmoore, and Robert W. Furness. "Effects of artificial lights and moonlight on petrels at St Kilda." Bird Study 57, no. 2 (2010): 244-251.
[103] Medina-Franco, R. A., Sangiorgi, P., & Valdés-Velásquez, A. (2025). Lost in the glow: understanding the impact of light pollution on storm-petrels. Avian Conservation and Ecology, 20(1).
[104] Syposz et al 2021. Avoidance of different durations, colours and intensities of artificial light by adult seabirds. Nature Scientific Reports 11:18941

devices which will redistribute fish species and attract piscivorous feeding birds, having an overall neutral to positive effect.

Conclusion

Following the conclusions from the Appropriate Assessment process, it can be concluded that there are not likely to be significant risks to these bird species from this proposed project.

To better ascertain the threat from individual isolated events, it is recommended that the operator report to the regulator any entanglement or mortality (as a result of the operation) of birds (or mammals).

The risk to the prey resources available to birds to feed are not likely to be significant, due to the move away from using wild caught wrasse for use as cleaner fish, and the high levels of flexibility in prey items of the diet of Cormorant.

Every effort should be made to stock with cleaner fish of aquaculture origin, but where this is not possible, and their use is necessary for sea lice control, wild cleaner fish should be sustainably sourced.

2.4 Land, soil, water, air and climate

2.4.1 Benthic Impacts

The seabed substrata is described, along with results from benthic surveys. The mean apparent redox potential discontinuity (aRPD) depths at the site ranged from maximum of 4.2cm (directly underneath the pens and at the edge of the pens) to a minimum of 1.5cm (10m from the pen) with no outgassing present at any of the sampling stations. Organic matter (as measured using LOI method) values recorded in 2019 at the site ranged from 1.79% to 3.56%. Impacts on the sediments are presented as predicted maximum monthly sedimentation rate at the pens is 1.4 mm per month of which 1.68 kg/m^2 of organic material per month (or 54 g per m^2 per day) – consisting mainly of food waste and faeces.

Fallowing is presented as a mitigation measure to benthic impacts.

The applicants EIA report references that increases in tonnages should only be allowed following satisfactory findings from the previous audit, that show that the benthic community can comfortably tolerate the existing tonnage, and that there is sufficient assimilative capacity to absorb any increases.

2.4.1.1.1.1 Applicant Conclusion

The applicant report concludes that the renewal application and requests change to the boundaries of the existing site and to the operating conditions attached to the licence, and the proposed operations will not give rise to long term negative effects on local sediment; it is concluded that there will be no significant effects.

2.4.1.1.1.2 MI Supplemental

Historical benthic audits are reviewed in Section 2.3.2.3. There were two failed audit in 2021 and 2025, likely based on husbandry and feeding related issues. From the benthic reports provided, the maximum reported stock levels at the site in the period from 2018 to 2025 was 2.186 t. The application to produce 2,177 t (from application form) is consistent with this reported tonnage.

Benthic audits are to be conducted at the time of peak biomass in each year, and this has been shown to be an effective measure to obtain reliable evaluation results[105]. The condition of the benthic environment varies in response to changes in salmon biomass, and conducting regular and continuous environmental assessments is essential for evaluating environmental impacts for sustainable management[103]. Recognising the sustained pressure that this tonnage is likely to bring to the benthic environment[106], it would be prudent to ensure benthic audits be used to demonstrate that the benthic community can tolerate the sustained production and that there is sufficient ecological capacity to absorb impacts in the vicinity of the site. Consenting should be contingent on the monitoring that supports the *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* showing that the impacts at the site are within the parameters detailed in the Protocol. If the site is unable to absorb the sustained pressures, as expressed through non-compliance with the parameters in the Protocol, then production levels or processes should be reviewed. The actions and approach would be detailed through the BAP (benthic amelioration plan) process, as outlined in the Protocol.

Conclusion

Current audits demonstrate a capacity for the benthic community to absorb the pressures from the current level of activities at the site. Considering the size of the footprint of the site and the localised impacts of the activity (production) ensuring a strong and functioning benthic community in the areas adjacent to the site), full recovery from disturbance can be expected to be achieved with cessation of activities. .

Consenting should be based on the benthic audits demonstrating the capacity of the surrounding environment to absorb the pressure. If the site is unable to absorb the sustained pressures, as expressed through non-compliance with the parameters in the Protocol, then production levels or processes should be reviewed - the actions and approach would be detailed through the BAP (benthic amelioration plan) process, as outlined in the Protocol.

[105] Wang C-D & Olsen Y. 2024. Monitoring regional benthic environment of Norwegian salmon cage farms. Aquacult Environ Interact. Vol. 16: 71–90, 2024 https://doi.org/10.3354/aei00474

[106] Brooks KM. 2001. An evaluation of the relationship between salmon farm biomass, organic inputs to sediments, physicochemical changes associated with those inputs and the infaunal response. Aquatic Environmental Sciences.; British Columbia. Ministry of Environment, Lands & Parks.; produced for The Technical Advisory Group.

Full compliance with the *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring* should be a requirement, if a licence is to be granted.

2.4.2 Water

Section 8 provides a description of the receiving environment, based on surveys and hydrodynamic modelling. Water depths at the site range from 15m to 50m. Information, and graphics, on tidal velocities and circulation at the site is provided. Freshwater inputs to the bay are detailed, and local salinities for monitoring sites in the area.

2.4.2.1.1.1 Applicant Conclusion

2.4.2.1.1.1.1 Nutrient

The EIA uses three-dimensional modelling to assess the fate of nutrient inputs from the proposed production at the site (Appendix 8). Additional data from 2010 to 2018 associated with Water Quality monitoring[107] are presented in Appendix 12.

The EIA concludes that the area will continue to comply with the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009) in terms of nutrients and BOD, and that any impacts on water quality, if realised, will be negligible and not significant.

2.4.2.1.1.1.2 Dangerous substances

Report Section 8.1.6.5 identifies role of the Dangerous Substances Directive (2006/11/EC) (76/464/EEC Repealed) and stipulates the rules for protection against, and prevention of, pollution resulting from the discharge of certain substances into the aquatic environment.

The EIAR notes MOWI use Slice®, Alphamax® and Paramove® for parasite control. Section 2.12 details treatments at the MOWI Site with Table 2.9 showing sea lice control treatments and quantities between 2010 and 2016. The EIAR notes the Regulations require that the level of discharge of a substance set by a licensing authority must be based on the relevant environmental quality standards (EQS) or objectives set in accordance with the WFD. Appendix 3 further elaborates treatment protocols used by MOWI for SLICE (medicated feed) and Alphamax (well boat).

Section 8.2 notes that if the renewal site is licenced, the area will continue to comply with the European Communities (Control of Dangerous Substances in Aquaculture) Regulations 2008 (SI 466 of 2008).

[107] Monitoring Protocol No. 2 for Offshore Finfish Farms- Water Column Monitoring. DMNR, 2000.

The overall conclusion for water quality (Section 8.3) is that *Discharges from the farm in its current form do not have a significant effect (positive or negative) on water quality. The renewal application requests change to the boundaries of the existing site and to the operating conditions attached to the licence. As shown above, discharges predicted from the proposed operations will not give rise to negative effects on water; it is concluded that there will be no significant effects.*

2.4.2.1.1.2 MI Supplemental

2.4.2.1.1.2.1 Nutrient and BOD Modelling

The hydrodynamic model and dispersion modelling that underly Section 8.2 Impacts on Water Quality lacks an important component, namely the wind forcing. Quoted from Section 3.2 of Appendix 8: *A hydrographic survey of the tidal currents in outer Kenmare Bay carried out by Irish Hydrodata (Aug 1990) indicated weak tidal stream velocities throughout the outer bay area and under the slack tidal streams that characterise the outer Kenmare Bay area the dominant influence on hydrodynamics will be meteorological conditions in respect to variable wind conditions. The mean wind condition is a 5.5m/s wind speed from the southwest.*

It is important to include wind forcing in the numerical modelling study in this area. Wind generated currents would likely cause quicker dispersion, i.e. more dilution and thus lower concentrations (in the context of water quality objectives), they may at the same time transport water masses over longer distances. The coastal waters in the southwest of Ireland is a region known for upwelling events. In the neighbouring Bantry Bay upwelling and downwelling events are observed, whereby near-bed and surface waters, respectively, are transported into the bay. These events are wind-driven and the lack of wind forcing in the model is considered a shortcoming - but as regards assessing local impacts, (e.g. nutrient enrichment), the lack of wind forcing is acceptable as it will result in less dispersion and thus represent a worse-case scenario than will be in reality.

2.4.2.1.1.2.2 Nutrients

Fish farms can be a source of inorganic nutrients (specifically nitrogen and phosphorus) arising from fish waste and uneaten feed. Enriched Dissolved Inorganic Nitrogen (DIN = nitrate + nitrite + ammonia) has the potential to impact water quality by causing excessive plant growth with subsequent, dissolved oxygen depletion. High levels of ammonia are known be toxic to marine life; levels of toxicity vary across different species and are dependent on pH, temperature and salinity of the surrounding waters[108].

[108] Australia & New Zealand Online Guidelines for Fresh & Marine Water Quality (Ammonia in freshwater and marine water - Technical Brief)

The dispersion model (Telemac-3D) used to evaluate impact of nutrient input on the surrounding water uses nitrogen and phosphorus loadings of 11.87 tonnes and 1.77 tonnes per month, respectively, based on production and feeding levels proposed at the site. The model N and P inputs (Appendix 8, section 4.2) are based on the period of peak biomass and feed output load that occurs in May of Year 2 of the production cycle.

It is not clear what nutrient concentrations have been incorporated into the model as background[109]. Spring and summer nutrient concentrations are substantially lower due to phytoplankton assimilation. The EIA Model suggests that even at the boundary of the licenced area, discharges from the fish farm would not lead to significant elevation above background, which implies that fish farm discharges would have no significant impact on the wider area. Empirical studies along a transect from a fishfarm by Jansen *et al.*, (2018)[110] support that indication. The study found that elevated ammonium concentrations had decreased to near background within 400 m down current from the cages. Model results from that study indicate the reduction is due to dilution and phytoplankton uptake. Price *et al* (2015)[111] also found that near field enrichment is usually not detected beyond 100 m from the farm, largely due to improved practices in aquaculture.

The assessment considers the model outputs with respect to available objectives for the Water Framework Directive (WFD)[112] for coastal and transitional waters as set in Surface Water Quality regulations (S.I. 77 of 2019), specifically the criteria representing High-Good status boundary and the Good-Moderate status boundary. It is noted that for assessing water quality of WFD water bodies, median concentrations are used to evaluate conformance with the objectives.

Nutrient data provided in the EIA (Table 8.5) from 2010 to 2018 were collected by the applicant as part of DMNR Aquaculture Water Quality Monitoring[113] and submitted to DAFM. The measurements also include nutrient concentrations from a reference site from 2014. More recent data from 2021 – 2023 have also been provided to MI by DAFM as part of the Aquaculture Water Quality Monitoring assessment and are further considered in this review. It is important to note that the data provided both in the EIA and the data provided to DAFM are limited to three or four winter sampling events per year, as required under the DCMNR Monitoring Protocol No. 2.

[109] OSPAR winter DIN background concentrations for offshore waters in the Celtic Seas area are approximately 109ug N/L. Reference value used to derive a regional threshold value for the Atlantic Seasonally Stratified area (Celtic Sea) in the most recent OSPAR comprehensive assessment of Eutrophication of the OSPAR Maritime area.

[110] Jansen HM, O. J. Broch, R. Bannister, P. Cranford, A. Handå, V. Husa, Z. Jiang, T. Strohmeier, Ø. Strand. 2018. Spatio-temporal dynamics in the dissolved nutrient waste plume from Norwegian salmon cage aquaculture. Aquaculture Environment Interactions 10: 385–399

[111] Price, C., Black, K., Hargrave, B., and Morris, J. 2015. Marine cage culture and the environment: effects on water quality and primary production. Aquaculture Environment Interactions, 6: 151–174.

[112] European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009)

[113] Monitoring Protocol No. 2 for Offshore Finfish Farms Water Column Monitoring. 11 May, 2000

The Deenish site is situated in the Southwestern Atlantic Seaboard Coastal Water Body; a very large coastal water body that was designated as High Status under the WFD in 2016-2021 cycle. Nutrient inputs from this farm would not be considered sufficient to significantly impact on the nutrient status of this water body. The site is also close to the Outer Kenmare River coastal waterbody which was designated as Good Status overall, although nutrient conditions were classified as High. In general, it has been reported that nutrient inputs from salmon farming are not seen to significantly impact wider nutrient levels in coastal waters, with improved practices over recent decades further reducing discharges (Price *et al*. 2015). Furthermore, Laurent et al (2006) suggests that nutrient enrichment from salmon farm is generally low[114].

2.4.2.1.1.2.2.1 Nitrogen

Surface Water Quality regulations No.272 of 2009 provides criteria for evaluating nutrient conditions for classification of coastal water status for dissolved inorganic nitrogen DIN of <170 µg/l (high status) and <250 µg/l (good status) at salinity of 34 and 34.5, respectively.

The modelling output as reported in the EIA finds highest concentrations of N are determined at the pens, although even at the pens, median concentrations are reported as <170 µg/L. Models show than DIN dissipates to approx. 20 ug/l at the edge of the licence area close to the pens. The model treats nitrogen conservatively, i.e. dispersion only, and does not account for additional removal of nutrients from the water column due to biological and chemical processes that occur in reality (assimilation, microbial, absorption, etc.).

Although the comparable salinity data are not provided in the EIA data, none of the annual median values exceeded the DIN objective for high status, even when assessed conservatively at assumed salinity of 34.5. The 2022 and 2023 water quality reports for the fish farm sites suggest higher median sample winter concentrations of DIN than earlier years; all DIN values from monitoring results appear to be primarily driven by nitrate. However, this is also the case at the control station, more than 7 km from the pens, where similar concentrations are reported. This almost certainly does not reflect impact from Deenish site, given that the control site is not within the area that might be significantly hydrodynamically influenced.

2.4.2.1.1.2.2.2 Phosphorus

While WFD water quality objective exists for phosphate in transitional waters, there are no criteria set for coastal waters, as DIN is generally considered the rate limiting nutrient for primary production in Irish coastal waters. In the absence of any coastal criteria against which to compare EIA model results,

[114] Laurent, C., Tett, P., Fernandes, T., Gilpin, L. & Jones, K., 2006. A dynamic CSTT model for the effects of added nutrients in Loch Creran, a shallow fjord. Journal of Marine Systems 61: 149-164.

median concentrations at the pens were compared against the transitional waters phosphate objective. The objective is salinity related with 0.025 mg P/L at 35 psu representing the high-good status boundary. All modelled results were found to be below the TW criterion, with concentrations reducing rapidly even at the edge of the licence site.

While phosphate monitoring results (results presented in Appendix 12 and additional data for 2021-2023 monitoring as reported to MI), indicate individual water sample concentrations at the pens that are sometimes in excess of the high status criteria for transitional waters, similar and occasionally higher concentrations are reported for the far-field control site (>7km distant). These concentrations almost certainly do not reflect impact of the fish farm so no evaluation can be made on the contribution of the fish farm.

2.4.2.1.1.2.2.3 Biological Oxygen Demand (BOD)

There is no objective set for BOD in coastal waters. EIA model results indicate 95%ile BOD at the edge of the licenced area meet the objective for transitional waters (High status - 95%ile of 3mg/L: SI 77 of 2019), used in the absence of a coastal water value.

Model outputs indicate median BOD concentrations below the WFD transition waters threshold of 3 mg/l the boundary of the licenced area.

The monitoring protocols do not specify BOD measurements to be taken so water column assessment cannot be carried out.

2.4.2.1.1.2.3 Dangerous substances

The European Communities (Control of Dangerous Substances in Aquaculture) Regulations 2008 (SI 466 of 2008) was introduced for the purpose of giving effect to the Dangerous Substances Directive, Habitats Directive and WFD on pollution caused by certain dangerous substances into the aquatic environment, so far as these Directives relate to the protection of waters in the marine environment from aquaculture activities. The schedule of substances therein lists EQS that should be achieved 100 m from the site 24hr post treatment. To note: the dangerous substance directive (2006/11/EC) was repealed in 2013 and subsumed into the WFD, but S.I. No. 466 of 2008, which also implements WFD, still stands.

Some general comments on the EIAR with respect to dangerous substances are provided.

Substances listed in EIAR

The disease and parasite control treatments listed in the EIAR as used by MOWI are listed in Table 2-6.

Table 2-6. Information on Chemo-therapeutants listed in EIAR Licence site T06-202 currently in use by the applicant.

Product	Active ingredient	Substance group	Use	Treatment	HPRA – Licence status. Atlantic Salmon	EQS[115] (SI 466 of 2006)
Alphamax (AMX)	1% deltamethrin	pyrethroid	Ectoparasiticide	Bath treatment	Licenced - Prescription only medicine (POM)	2ng L^{-1} 24hr post treatment 100m from the site
SLICE	Emamectin benzoate (EmBz) 2 mg/g premix	avermectin	Ectoparasiticide	Medicated feed	Licenced POM	0.22ng L^{-1} 24hr post treatment 100m from the site
Paramove	Hydrogen peroxide (49.5%)		Disinfectant	Bath treatment Dosage is 1,500ppm H2O2 for 12 to 15 minutes,	Licence withdrawn 25/04/2023	n/a
Maracycline	Oxytetracycline hydrochloride 500 mg/g Premix	tetracycline	Antibacterial	Medicated feed	Licenced POM	n/a

The EIAR indicates that preventative measures rather than medicinal treatments are key to disease and infestation control at the site, e.g. vaccination, lower stocking density associated with organic farming, and use of cleaner fish. Table 2.9 (in the EIAR) reports relatively infrequent use of these medicines reported 2010 – 2016 for disease and infestation control.

Alphamax, SLICE and Maracycline are licenced by Irish Health Products Regulatory Authority (HPRA) for salmon and are Prescription Only Medicines. SLICE and Alphamax are the only licenced treatments currently approved by the HPRA for sea lice control on Atlantic Salmon. SLICE is applied as surface-coated medicated feed and the Alphamax as a bath treatment.

With respect to non-target organisms, crustaceans are particularly sensitive to exposure to deltamethrin and Emamectin benzoate (EmBz). National water EQS[116] are in place for EmBz (0.22 ng L^{-1}) and for deltamethrin (2 ng L^{-1}) and are applicable at 24 hours post treatment at 100m from the site (SI 466 of 2008).

The EIAR (section 8.3) concludes *Discharges from the farm in its current form do not have a significant effect (positive or negative) on water quality. The renewal application requests change to the boundaries of the existing site and to the operating conditions attached to the licence. As shown above, discharges predicted from the proposed operations will not give rise to negative effects on water; it is concluded that there will no significant effects.*

[115] The European Communities (Control of Dangerous Substances in Aquaculture) Regulations 2008 (SI 466 of 2008)
[116] SEPA EQS for sea lice treatments that are used in aquaculture in Ireland (www.gov.ie)

The Deenish site is at the mouth of Kenmare Bay and relatively exposed and thus any discharges at the site to the water column would be expected to be rapidly diluted and dispersed. However, the EIAR does not detail any modelling of substance dispersion from the site as a point source to verify whether the above EQS criteria would be achieved, for example from inputs following typical or significant treatment regime to treat a disease or an outbreak. It may be possible to infer this from the dispersion models applied to evaluate nutrient impacts.

The EIAR indicates well boats will be used for bath treatments, reducing medication use and the dispersal of used medication into inshore waters. A recent study in Norway found elevated and potentially harmful concentrations of deltamethrin at distance from the point of release[117], although this specific study cannot be directly extrapolated to the Deenish site, which will have different hydrodynamic conditions and likely different treatment regimens and discharge loads. Deltamethrin well boat treatment concentration is 2µg L^{-1} according to the information provided in the EIAR, so a 1000-fold dilution would be required to achieve the level of the EQS. In all operations, the operator should aim to maximise dilution and minimise impacts on non-target species, taking into consideration release rates and tidal states. The operator should ensure that EQS are not breached (notwithstanding the use that apply on the release of water from a fish health perspective).

Release of EmBz would be from uneaten feed settling to bottom under the pens and from fish waste/excreta, which the EIAR highlights is released during (10%) and exponentially post treatment. As such release would be expected to be more extended than the pulse release that would be associated with bath treatment discharge. It is noted that Scotland have a recently adopted a sediment EQS for EmBz (272 ng Kg^{-1} dry weight at mixing zone limit & beyond) based on technical advice of WFD UKTAG[118,119.] No specific information is included in the EIAR for potential EmBz discharges to sediment, and dispersal but the EIAR noted that EmBZ breaks down into "non-toxic" sub-compounds with a half-life period of 250 days. This is within the range of EmBZ half-lives reported by Hamoutene et al 2023[120]. Studies elsewhere have shown EmBZ can be detected in sediments following treatment but close to pens and this depends on treatment regime and local conditions[121].

[117] Arnberg, M., Refseth, G. H., Allan, I. J., Benedetti, M., Regoli, F., Tassara, L., Sagerup, K., et al. 2023. Acute and Sublethal Effects of Deltamethrin Discharges from the Aquaculture Industry on Northern Shrimp (Pandalus borealis Krøyer, 1838): Dispersal Modeling and Field Investigations. Environmental Science & Technology, 57: 3602–3611. American Chemical Society. https://doi.org/10.1021/acs.est.2c07459

[118] SEPA Environmental Standards (Scotland) SEPA Link

[119] EMB EQS report - June 2022 - UKTAG signed off - revised 20230224.pdf (wfduk.org)
Note the UKTAG also calculated seawater MAC_QS and AA-QS for EmBz of 1.2 and 0.17 ng l-1 noting thecalcuated MAC-QS is higher than the EQS 0.22 ng L^{-1} in SI 466 of 2008

[120] D. Hamoutene, M. Kingsbury, J. Davies, A. Le, D.R. Blais, M. Gagnon. 2023. The persistence of emamectin benzoate in marine sediments with different organic matter regimes, temperature conditions, and antibiotic presence. Mar. Pollut. Bull., 197, Article 115714

[121] Ikonomou, M.G. 2023. Environmental Fate and Potential Biological Effects of the Anti-Parasitic Chemo-therapeutant Emamectin Benzoate (active ingredient of SLICE®) in the Canadian Marine Environment. DFO Can. Sci. Advis. Sec. Res. Doc. 2023/060. iv + 25 p

Paramove (hydrogen peroxide) is listed as a treatment in the EIAR. Since submission of the EIAR, the HPRA approval for Paramove for Atlantic Salmon has been withdrawn (24/4/2023) and it is the understanding of the Marine Institute that this product is no longer in use. The applicant noted in a response to the public consultation that *Only treatments approved by the Irish Health Products Regulatory Authority (HPRA) and organic regulations are permitted for use in organic farms*. Veterinary medicinal products used to treat aquaculture animals should be used under veterinary supervision and in accordance with national and European legislation.

Maracycline (oxytetracline) is a commonly used antibiotic and has been widely used in the global finfish aquaculture. There is no EQS currently established for oxytetracline, either in WFD or as supplementary EQS in relation to aquaculture. With widespread fish vaccination used to prevent disease, the requirement for antibiotic to treat disease in fish has diminished over recent decades.

The possibility cannot be excluded that other treatments may be prescribed by vets to address specific animal health needs under an AR16 licence, if there are no suitable licenced treatment available, but this is difficult to foresee. Veterinary medicinal products used to treat aquaculture animals should be used under veterinary supervision and in accordance with national and European legislation.

Measures and regulations to mitigate inputs of other substances that may be inadvertently introduced to the marine environment from fish farming activities are discussed. These could include antifoulants that may be used on structures or boats, or contaminants/additives in feed, and EIAR Section 2.5 states that "*In compliance with organic standards, no net antifouling treatment will be used*." Mechanical approaches are widely used to address biofouling of cages. It is recommended that net anti-fouling treatments not be used at this site.

Zinc is an essential microelement that is often added to salmon feed to ensure fish do not suffer zinc deficiency, which can have serious health impacts. Animal feed is subject to European maximum limits established for specific contaminants and additives. The EC maximum permitted level for zinc in salmon feed is 180 mg/kg (Commission Implementing Regulation 2016/1095 as amended). The applicant's policy on feed (EIAR Vol 3 - page 53) states "Organic feeds must conform and be certified to the animal feed requirements of EU Organic regulations 834/2007, 889/2008 and 710/2009.- Organic feeds must conform and be certified to the animal feed requirements of EU Organic regulations 834/2007, 889/2008 and 710/2009." The operation should comply with all relevant Irish and EU regulations.

Conclusion

Nutrients

Based on the applicant-provided nutrient data in the EIA, there does not appear to be a likely significant elevation of nutrient concentrations on the wider area resulting from farm inputs.

Sediment type beneath the cages is described as ranging from fine/medium sands, with coarse shell fragments, indicating that this is not a low energy environment.

Model outputs indicate that the area of influence around the pens is limited to the licenced area and the close surrounding area to the north of the licenced area. Predicted concentrations for both DIN and phosphate are predicted to dissipate within the boundary of the licenced site. This is supported by other studies[122,123]. Median nutrient concentrations are predicted to be within WFD objectives for high status, even at the edge of the licenced site, even with conservative dilution only modelling approach at a period of maximum production. The combination of modelling and review of annual water-quality monitoring data for the existing site indicates that nutrient discharges from the fish farm will not significantly impact on surrounding water bodies.

Dangerous substances

Section 8.2 of the EIAR notes that if the renewal site is licenced, the area will continue to comply with the European Communities (Control of Dangerous Substances in Aquaculture) Regulations 2008 (SI 466 of 2008). It is not clear how this is evaluated. While the site location is relatively exposed and effective dilution/dispersion may occur, modelling to ascertain dispersion of substance discharge has not been reported.

Procedures for discharging treatment solution from well boats post-treatment should be devised, to maximise dilution and minimise impacts on non-target species.

Overall, should the Minister decide to grant this licence, the following conditions should apply:

- Veterinary medicinal products used to treat aquaculture animals should be used under veterinary supervision and in accordance with national and European legislation.
- It is recommended that net anti-fouling treatments not be used at this site.
- Ensure inputs of chemical substances to water, including discharges of treatments, do not lead to non-compliance with current EQS for substances listed in the schedule of SI 466 of 2008.
- The operator should pre-notify DAFM of discharges of chemotherapeutants from well boats providing evidence to demonstrate that EQS will not be breached.

[122] H. M. Jansen, O. J. Broch, R. Bannister, P. Cranford, A. Handå, V. Husa, Z. Jiang, T. Strohmeier, Ø. Strand. 2018. Spatio-temporal dynamics in the dissolved nutrient waste plume from Norwegian salmon cage aquaculture. Aquaculture Environment Interactions 10: 385–399.

[123] Price, C., Black, K., Hargrave, B., and Morris, J. 2015. Marine cage culture and the environment: effects on water quality and primary production. Aquaculture Environment Interactions, 6: 151–174

- Ensure inputs of chemical substances to water, including discharges of treatments where relevant, do not lead to non-compliance with relevant EC and national EQS established for WFD priority substances and River Basin Specific Pollutants (SI 272 of 2009 as amended by SI 386 of 2015 and SI 77 of 2019). Note that Priority Substances and River Basin Specific Pollutant lists and EQS are reviewed and amended from time to time.
- Ensure nutrient inputs support achievement of regulatory water quality objectives as per surface water regulations and not lead to a deterioration of water quality status.
- The operator should ensure that nutrient inputs support achievement of regulatory water quality objectives, as per surface water regulations. The licensee should annually report surface and bottom water concentrations of winter Dissolved Inorganic Nitrogen and Dissolved Inorganic Phosphorus measured monthly Dec – April at: a station (A) at the site of the pens; at stations (B & C), each 100m in the opposite directions from the pens along the axis of predominant current direction; and at a reference site (station D) agreed with the Marine Institute and at least 500m distant from fish farming activities.
- The operator should ensure that operations minimise discharges, emissions and losses of nutrients and potentially dangerous substances to the marine environment and mitigate the risk of impact on non-target species.
- The operation should endeavour to minimise the use of chemotherapeutants through utilising efficient disease and parasite control strategies, such as vaccination and non-medicinal treatment for parasite control.
- The operation should comply with all relevant Irish and EU water quality regulations.

2.5 Air and Climate

2.5.1 Air Quality

The Applicants EIAR uses Environmental Protection Agency (EPA) data and the Air Quality Index for Health (AQIH) to assess current status. It identifies the Kenmare Bay area as within the 'Rural West' region, and reports the region as being assigned an index of 3[124] and categorised as Good, with no facilities nearby that could result in air contamination (the nearest being 45 km away).

The main source of atmospheric emissions from the operation are identified as engine exhaust gases from engines and diesel generators associated with the service vessels and vehicles. The principal atmospheric emissions associated with fuel combustion are identifies as carbon dioxide (CO_2), nitrous oxide (NO_2), CH_4, SO_2, carbon monoxide (CO) and volatile organic carbons (VOCs), of which CO_2, CH_4

[124]The Air Quality Index for Health (AQIH) is based on a scale of 1 to 10 with higher values indicating lower air quality.

and NO_2 are considered the principal greenhouse gasses. NO_2 is considered to have the greatest ability to trap heat having a GWP (Global warming potentials) of 310, compared to 21 for CH_4 and 1 for CO_2.

2.5.1.1 Applicant Conclusion

The applicants EIAR concludes that emissions from the current farm do not have a significantly affect (positive or negative) on air quality and climate, and, if approved, the requested changes to the existing licence will not lead to significant changes in emissions associated with the Deenish site, and the renewed licenced and changes will have no significant effects on air and climate. The proposed project is not considered a major source of greenhouse gases, and any predicted emissions are considered insignificant on a national scale.

2.5.1.2 MI Supplemental

The AQIH Index of 3 and categorisation as Good still holds for the location as of April 2025. The GWP for some gases mentioned have been updated and is currently 265 for NO_2, 28 for CH_4 an 1 for CO_2[125].

The Air Pollution Information System tools[126] provide a comprehensive source of information on air pollution and the effects on habitats and species to support assessments. The APIS tool provides pollutant data for the specific location of the site for a number of parameters, including Total N deposition, acid deposition, ammonia, NOx (including NO_2), and SO_2. None of the reported levels of these parameters reach the minimum critical load or the critical level for any of these parameters as reported for the conservation features of the Deenish Island and Scariff Island SPA or Kenmare River SAC.

Considering the remote, off-shore location of the project, the number and size of the vessels involved, and the proposed level of activity, it is not likely the proposed project will have significant impact on air quality in this area.

2.5.2 Climate

The applicants EIAR addresses air and climate together, focusing engine exhaust, from diesel generators, service vessels, and vehicles, as detailed above. Concluding that the renewed licenced and changes to the operating conditions will have no significant effects on climate.

The applicant provided extra commentary in response to the consultation process. This states that MOWI has adopted a global approach to climate change which is aligned with climate science (their targets are approved by the Science Based Targets Initiative, SBTi) and the Paris Agreement to limit the increase in the global average temperature to 1.5°C above pre-industrial levels by the end of the

[125] https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
[126] https://www.apis.ac.uk/

century. MOWI has chosen to pursue the Representative Concentration Pathways (RCP) 2.6 pathways and the climate scenario that will limit the global average temperature to 1.5°C above pre-industrial levels.

Their energy consumption and GHG emissions data are reported internally and audited by an independent third-party annually. They disclose their GHG emissions strategy and performance in association with the Carbon Disclosure Project (CDP). MOWI has maintained its CDP climate rating at A- reflecting their continuous work on performance and transparency on climate-related metrics.

They are working in collaboration with their peers in the seafood sector and other ocean economies (High Level Panel for a sustainable ocean economy) and the UN Global Compact to optimise the value of the ocean to produce more sustainable food as a strategy against climate change, while at the same time increasing their understanding of the potential impact of climate change on their business. MOWI also collaborates with science to further advance their focus on circularity and climate change.

They also engage with public policy officials to discuss the topic of climate resilience in the seafood sector. Through the Federation of European Aquaculture Producers and national industry associations they engage with governments, public policy officials, scientists and NGOs towards sustainable seafood production, healthy ocean, sustainable finance (including green bonds and sustainability-linked finance) and ESG disclosure regulation and standards (such as GRI, TCFD and TNFD).

GHG emissions from Irish salmon aquaculture is relatively low when compared to other protein sources such as poultry, beef, or lamb. 3.88 CO2 eq./kg of organic farmed salmon compared to 11.75 kg CO2 eq./kg of cattle[127].

MOWI is part of the advisory network of the High Level Panel for a sustainable ocean economy which comprises more than 135 private sector, non-governmental organisations, and intergovernmental organisations across 35 countries. As a member of the advisory network, they aim to share knowledge on existing initiatives and actions within ocean-farming that can contribute to the High Level Panel's aim of advancing a new relationship between humanity and the sea that protects the ocean and optimises its value to humankind[128]. In addition, this network allows a discussion with public policy officials on topics such as climate change and ocean pollution.

The Blue Food Assessment, the High Level Panel for a Sustainable Ocean Economy, and FAO's Blue Transformation roadmap, continue to provide a credible and transparent assessment of the potential of aquaculture as a sustainable ocean economy. Blue foods have lower environmental footprints than

[127] BIM, 2023. https://bim.ie/wp-content/uploads/2023/02/BIMCarbon-footprint-report-of-the-Irish-Seafood-Sector-1.pdf
[128] https://www.oceanpanel.org/.

land-based foods. Farmed salmon in particular has lower GHG emissions, water use and land use when compared with chicken[129].

In response to a comment regarding fish farms requiring significant energy for water circulation and temperature control, open net pen marine fish farming sites, like Deenish, are located in areas where the water flow is sufficient to assimilate uneaten fish feed and fish faeces without significant effect on the environment and where water temperatures are suitable for the fish being reared. Water circulation and water temperature control are not a requirement for rearing the fish at these sites, and hence they use much less energy than would be required for operating fully enclosed pens or terrestrial grower sites.

2.5.2.1 MI Supplemental

In 2023, BIM published a Carbon Footprint report of the Irish Seafood Sector [130]. It states that global food production accounts for approximately 30% of total carbon emissions from human activities. The global seafood sector accounts for a small portion of this overall figure (circa 4%). It states that the Irish aquaculture sector contributes 16.5% of the total Irish seafood GHG (Green House gas) emissions. Irish farmed salmon emits 3.88 kg tCO2 eq./kg, which makes it a low carbon food source. The imported feed for salmon farming accounts for ~60% of that 16.5% of GHG emissions. The other factors are transport, farm energy use, smolt production, and operational waste.

In international reports outlining the contributors to GHG and climate change[131,132,] aquaculture is not cited as a significant contributing factor. The IPCC highlights that marine aquaculture will decline under increasing temperature and acidification conditions by 2100, with potential short-term gains for finfish aquaculture in some temperate regions and overall negative impacts on bivalve aquaculture due to habitat reduction[133].

By way of clarification - of the future sea temperature projections reported by the Marine Institute in the referenced (by consultation) climate report - Nolan et al. 2023[134], it reports on projected sea surface and seabed temperatures in the southwest of Ireland averaged over 2006-2035 and compared to 1975-2005 period. The projections are based on the 5th IPCC assessment report, which is now surpassed by the 6th assessment[135]. These new projections are work in progress by the MI. As regards

[129] https://mowi.com/blog/blue-food-assessment-showsbenefits-of-salmon-farming/
[130] BIM 2023. Carbon Footprint report of the Irish Seafood Sector Summary - Link
[131] Hannah Ritchie (2020) - "Sector by sector: where do global greenhouse gas emissions come from?" Published online at OurWorldinData.org Link
132 Agriculture Sector Emissions - US EPA
[133] IPCC_AR6_WGII_FullReport.pdf
[134] Nolan, G., Cusack, C., & Fitzhenry, D. (Eds.) (2023). Irish Ocean Climate & Ecosystem Status Report. Marine Institute, Galway, Ireland
[135] IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

the projections presented in Nolan et al. 2023, the scientific consensus at present is that the RCP8.5 scenario (i.e. the most pessimistic scenario) will not materialize and the RCP4.5 scenario was more realistic. As presented in Nolan et al. 2023, if RCP4.5 was to materialize, it implies c. 0.1°C increase in average 2006-2035 sea surface temperature in the vicinity of Deenish and c.0.25 °C increase in average 2006-2035 seabed temperature.

The applicant has operated several farm sites along the coast of Ireland since 1979, with differing temperature profiles and has experience of elevated summer temperature over that period of operation. Given the substantial investment required to operate any farm the applicant would not risk any investment if it were deemed unsustainable. It should be noted that wild salmon and sea trout are exposed to the same temperature profiles as farmed salmonids and as such are exposed to the same potential risks.

Considering the above, it is the view of the Marine Institute that the activity proposed does not represent a significant GHG contributor and subsequent impact on climate change.

2.6 Noise

Information on the sources of noise are provided, which include small numbers of personnel and vessels, the feed barge, along with heavier machinery at other occasions. Noise is not considered a significant feature of such an operation, or a likely or significant environmental impact mechanism.

2.6.1.1 Applicant Conclusion

The report concludes that there is no evidence that these noise levels from the current farm are having any impact, and, if approved, the requested licence will not lead to significant changes in the nature and level of operations with respect to noise emissions; any impacts, if realised, will be Negligible. The renewed licenced and changes to the operating conditions will have no significant effect on the ambient noise climate.

Section 6.3.2 of the report states that Acoustic Deterrent Devices (ADDs) as anti-predator devices, have never been required at the site, and that it is extremely unlikely that they will be required if the licence is renewed. Therefore, there will be no impacts due to these devices.

The likelihood of impacts occurring is remote; it is concluded that there will be no significant effects to pinniped or cetacean species.

2.6.1.2 MI Supplemental

Primary sources of noise from the facility are likely to be from operational activities, involving boats, barges. The effects of noise reduce with distance. The farm is adjacent to an uninhabited island.

Noise disturbance on protected species, such as birds and mammals, is considered in the Appropriate Assessment reports. ADDs are not planned to be used at this site. It is recommended that the use of Acoustic deterrent devices (ADDs) as a potential predator control measure be prohibited, due to potential impact on non-target species (see Section 2.3.3).

Conclusion
It is not likely that noise will have a significant impact should this site be licenced. It is recommended that the use of Acoustic deterrent devices (ADDs) as a potential predator control measure be prohibited, due to potential impact on non-target species.

2.7 Material Assets

2.7.1 Traffic

The applicants EIAR describes the traffic (car) in the local electoral areas, and quantifies impacts based on the number of employees from the project (7-11 employees).

The report concludes that the existing licence does not have a significantly affect (positive or negative) on traffic, and the renewal, if approved, will not lead to significant changes in traffic volumes, therefore having no significant effect on traffic.

2.7.1.1 MI Supplemental

The DAFM Marine Engineering Division (MED) have provided an addendum report where Material asset – Traffic is considered, MED has accessed and inspected the existing site with no significant traffic issues observed. MED concludes that there is no significant impact on traffic due to this application.

2.7.2 Shipping/Navigation

The applicants EIAR identifies the main piers to be used by the proposed activity, and concluded that shipping traffic associated with the existing licence does not have a significantly affect (positive or negative) on traffic, and the proposed licence, if approved, will not lead to significant changes in shipping traffic associated with the Deenish site, and will have no significant effects on shipping.

2.7.2.1 MI Supplemental

The Department of Transport – Marine safety office, in their statutory consultation response, has no objection from a safety of navigation viewpoint to the application. The Commissioners of Irish Lights raised no objection to this renewal, pointing out that it is important to ensure that no navigable inter-tidal channels are impeded by any structures, and that all structures must be clearly marked as required by Regulations and Licensing Permit conditions and to the approval of the Marine Survey

Office. They recommend that the clause “That the applicant is required to secure Statutory Sanction from the Commissioners of Irish Lights for the aids to navigation for marking the structures as required by the Marine Survey Office.” And they provide details on how to do this. CIL also point out that if a licence is granted, the UK Hydrographic Office must be informed of the development's geographical position in order to update nautical charts and other nautical publication.

The DAFM MED have accessed and inspected the existing site for many years with no significant shipping or navigation issues observed. They conclude that there is no significant impact on shipping and navigation due to this application.

Conclusion

It is concluded that the operation does not lie on any direct navigation routes, and there is no significant impact on shipping and navigation due to this application..

The clause “That the applicant is required to secure Statutory Sanction from the Commissioners of Irish Lights for the aids to navigation for marking the structures as required by the Marine Survey Office.” should be included as a licence condition, and the applicant should inform the UK Hydrographic Office of the development's geographical position in order to update nautical charts and other nautical publication.

2.7.3 Commercial Fisheries and Aquaculture

2.7.3.1 Applicant Conclusion

The EIAR describes a range of fishing activity in the Ballinskelligs Bay to Kenmare Bay region. It finds that the existing licence does not significantly affect fisheries in the bay. The existing licence overlaps one fishery; namely the lobster and crab fishery. If approved, the requested changes to the site boundaries will increase the spatial overlap with the lobster and crab fishery from 14.5ha to 33.5ha. This increase in spatial overlap is considered insignificant relative to the lobster and crab fishing area identified in the vicinity of the site.

The report concluded that the renewal of the licence and change to operating conditions of the licence will not significantly affect fishing.

The EIAR identifies a number of licenced aquaculture operations in the area, including 5 other salmon locations, and a large number of various shellfish sites. The Single Bay Management tool is used to coordinate with other finfish sites. The report concluded that the renewal of the existing licence at the site would equate to an increase in the economy for aquaculture production, which they classify as a positive effect.

The report states that the renewal of the existing licence will see production at the site increase, and this increase in salmon production would have a positive economic effect locally.

2.7.3.2 MI Supplemental

2.7.3.2.1 Fisheries

The MI have not undertaken a quantitative assessment of the spatial overlap between local small scale coastal fisheries, and the proposed licence area. Detailed data on the precise location of such fisheries relative to the proposed licence area are not available. The EIAR report refers to presence of pot fisheries for crab lobster and shrimp and other trawl and net fisheries in the region. The data referred to is up to 2016 only. The report provides estimates of overlap with lobster and crab fishing of 14.5 ha under the previous licence and 33.5 ha under the proposed new site boundaries. Although this is not significant at a fleet or regional level it is likely that some operators could be impacted and on-going cooperation with other users is advised - however following public consultation, this was not raised as a significant issue.

An *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175)] r*eport was also conducted which considered the potential in-combination effects of the proposed activity in-combination with wild fisheries interactions on protected species in the Natura 2000 sites. A fisheries risk profile is provided. This report concludes that there are no clear cumulative effects identified with fishing activities in this SAC - cumulative adverse effect on the habitats in this SAC is not likely and that there is highly unlikely to be a cumulative effect with fishing activities in this SAC to the QI Harbour seal from the proposed activities. The overlap with of the proposed activity with the identified fisheries (dredging, demersal, trawling) is considered to be insignificant on a fleet or regional level.

The Sea-Fisheries Protection Authority, in their response to consultation, observe that the proposal will have no negative impacts on existing wild fisheries in the area.

2.7.3.2.2 Aquaculture

The environmental effects are considered elsewhere in this document. The Sea-Fisheries Protection Authority, in their response to consultation, observe that the proposal will have no negative impacts on shellfish growing areas.

Conclusion

Overlap with lobster and crab fishing is not considered significant at a fleet or regional level, however, it is likely that some vessel operators could be impacted and on-going cooperation with other users is advised, but no issues were raised in consultation.

The environmental effects of aquaculture are considered elsewhere in this document.

2.7.4 Tourism and Recreation

The applicants EIAR maps and describes the key tourism and recreational sites in the region, identifying tourist numbers (in the region) and the key tourism focus areas. Landscape, seascape, history and cultural qualities in the area including the 'Wild Atlantic Way', along with diving, sea angling, salmon fishing, and cruise destination are identified as the key tourist attractors.

The report concludes the renewal will increase the site boundary and number of operational pens, which could result in surface equipment being visible by tourists, but concludes that visible equipment would not be significant and the renewal of the licence will have no significant effect on tourism or recreational activities.

2.7.4.1 MI Supplemental

Failte Ireland had no observations regarding any significant impacts on tourism and recreation. The DAFM MED concludes that there is no significant impact on tourism and recreation due to this application.

The impacts on wild salmonids, and by implication on the salmonid fisheries locally (and associated tourist activities), are assessed in Section 2.3.5 of document, concluding that maintaining salmon lice levels as close to zero as practicable to minimise any potential negative effects on wild salmonid populations is required, and that this can be achieved through adherence to *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control*, which adherence to should be a condition of any license that may be issued. Considering this assessment and the proposed mitigation, there is unlikely to be a significant in-combination effect with tourism and recreational activities from the proposed activities.

2.7.5 Waste Management

2.7.5.1 Applicant Conclusion

Information on the sources of waste are provided. Organic waste products include blood water from harvesting operations, other harvest effluent, mortalities or slaughtered fish.

The report concludes that there are currently facilities and requirements in place for waste management; as a result, the renewal license will have no significant effects on the waste management process and therefore no significant effect on the local environment of the site.

2.7.5.2 MI Supplemental

The documents *Standard Operating Procedure for Waste and Waste Management*, *MOWI Ireland - Fish Health Management Plan - 2019*, and *MOWI Ireland Environmental Management Policy* provide details procedures on policies and procedures regarding the approach to waste management of the proposed project. Key expected outcomes include:

- That the operator endeavours to minimise waste, and makes adequate provision for the removal and responsible, sustainable disposal of all waste, according to local regulations and by approved operators.
- That the disposal of dead fish and waste organic produce be in a responsible manner and by approved operators, and in a manner acceptable to the regulators.
- That the storage of feed is in a manner that is secure to prevent spillage and wastage.
- That the storage of chemicals, veterinary medicinal products, and fuels is in a manner that is secure to prevent release to the environment and improper use, and disposal is in a responsible manner.

Conclusion

Following the outlined waste management policies and procedures should ensure there is no significant waste effect on the local environment at the site. Key expected outcomes include:

- That the operator endeavours to minimise waste, and makes adequate provision for the removal and responsible, sustainable disposal of all waste, according to local regulations and by approved operators.
- That the disposal of dead fish and waste organic produce be in a responsible manner and by approved operators, and in a manner acceptable to the regulators.
- That the storage of feed is in a manner that is secure to prevent spillage and wastage.
- That the storage of chemicals, veterinary medicinal products, and fuels is in a manner that is secure to prevent release to the environment and improper use, and disposal is in a responsible manner.

2.8 Cultural Heritage and Archaeology

The applicants EIAR describes a detailed archaeological assessment that was carried out (and supplied), which considers sites on the islands, and any shipwrecks. The seabed within and adjacent to the site are identified as having low potential for the retention of archaeological material. A sonar survey did not identify anything of interest.

The activity is deemed to not have impacts on adjacent townlands or recorded sites, and no archaeological features or indications of archaeological materials were identified at the site. Therefore it is concluded the renewal of the licence will have on significant effect on cultural heritage including archaeology. It is proposed that the bedding path and location of the proposed anchoring system should be diver-truthed prior to the deployment of the anchoring system and a further side-scan survey should be conducted over the Deenish site following the installation of the anchors to determine if their installation has revealed the existence of submerged archaeological material.

2.8.1.1 MI Supplemental

The Department of Housing, Local Government and Heritage had no observations regarding any significant impacts on cultural heritage and archaeology. The DAFM MED considered the Cultural Heritage and Archaeology, considering sites and wrecks locally and concluded that there is no significant impact on cultural heritage and archaeology due to this application.

2.9 Landscape and Visual Resources

2.9.1 Landscape and Visual Resources

The applicants EIAR assesses the impact of the aquaculture site on the visual landscape following the guidelines as detailed in '*Guidelines for the Assessment of the Landscape and Visual Impacts of Marine Aquaculture Operations*'[136], using scales for sensitivity, impact magnitude and significance level. The areas are assesses as landscape charter areas (as defined by Kerry County council and categorised according the Heritage Council), and those nearest the site are described.

The assessment considers amenity zone categories as assigned by Kerry County Council in their development plan. Secondary Special Amenity zones make up the majority of the landscape areas surrounding Kenmare Bay including Deenish Island, however areas including Derrynane bay and islands off Lambs Head are designated Prime Amenity.

The report concludes that the increase in the area and number of pens will not be significant to pose an impact on the landscape. The site will be utilising already present access roads. The assessment used a 7 km distance for visual impact assessment, rather than the 4 km suggested in the guidelines, based on the elevated view points on the N70 road. Photographs are provided from 13 or the prominent vantage points locally, with commentary on site visibility.

[136] DMNR 2001. https://catalogue.nli.ie/Record/vtls000232494

The applicant proposes mitigation to make every effort to maintain the site in good order utilising pens and associated moorings, buoys, top nets etc. in a way to have minimal impact as possible on the environment.

The report conclusion comments on the subjectivity of visual impacts, dependant on the observer. It classifies the visual impact as moderate for new installations, but classifies the overall impact as slight or negligible based on the fact that site is an existing operational site. It concludes that, if approved the renewed licence will have no significant effects on landscape and visual resources.

2.9.1.1 MI Supplemental

The DAFM MED concludes that considering the distance of the site from the shoreline and nature of the development and structures, including an increase to 15 pens, the visual impact of the development will be low, and that there is no significant impact on Landscape and Visual Resources due to this application.

2.10 Cumulative Impact Assessment

2.10.1.1 Applicant Conclusion

The sites considered for cumulative impact are other salmon farm sites in the area (Doon Point, Killmacillogue Harbour, Inishfarnard). Two sites are excluded based on distance and hydrography (Doon Point and Killmacillogue). Discharge (sea lice larvae, settleable solids, nutrients, oxygen demand and dangerous substances) from the farm are identified as the only potential cumulative hazard with the Inishfarnard site. Modelling exercises indicated that as plumes of discharges from the respective sites do not combine, being separated by the deep Kenmare Bay channel, cumulative impacts are unlikely to occur.

2.10.1.2 MI Supplemental

Cumulative effects from activities that may have additive or synergistic effects with the proposed plans must be considered. Potential in-combination effects must consider permitted activities (discharge or extraction consents), approved plans or projects in progress, applications, activities for which no consent is given or required, and natural processes. The effects from aquaculture activities are site specific. A pressure-based approach is used, based on the pressures from this project, with equivalent pressures from other plans or projects where exposure can be assessed, based on the combined significance of each effect.

There are 4 other licences salmon production sites in the Kenmare River SAC, and 41 licenced shellfish or seaweed sites. The nearest extensive aquaculture site is >11 km from the proposed site. The main species cultured on extensive farms are mussels, with some oysters and seaweed proposed from other

sites. Shellfish (mussel) culture may have an impact on the benthos due to sedimentation, which can result in change to benthic community structure, broadly similar to that resulting from the fish farming, although not to such a broad extent. This potentially additive effect may result in change in species composition (structure) beneath the shellfish site. However, the function will unlikely change as a result of the extensive culture systems. Considering the distance, and the low potential for additive effect, there is unlikely to be significant cumulative effects or in-combination effects with these activities.

The nearest licenced finfish site is > 13km from the site, on the other side of the Kenmare Bay with other licenced or applications further in the Bay, within the SAC. These are identified in Figure 2-5.

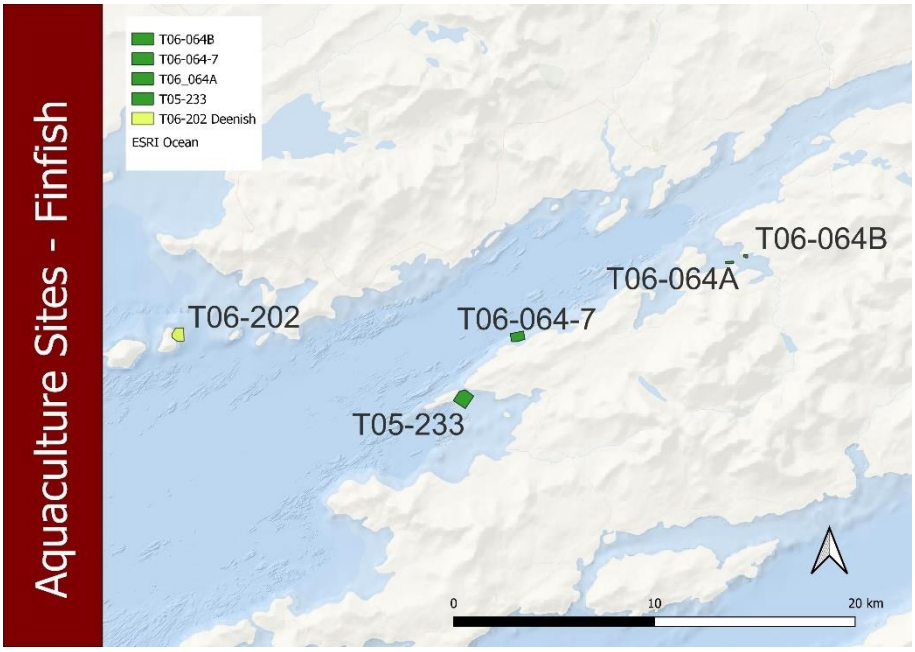


Figure 2-5 All finfish sites in Kenmare Bay.

Potential in-combination risk factors include farm discharge (feed waste, fish excretion, and release of chemoterapeutants) and biological dispersion (parasites such as sea lice, diseases). The modelling detailed in the Environmental Impact Assessment accompanying the application indicates that there is a separation between the north and south of the Bay by the deep Kenmare Bay channel, and that there is limited northerly or southerly flows (i.e. limited hydrological connection between the sites). The report indicated that the spatial footprints of discharges from the sites do not overlap. Given the distance and lack of hydrological connectivity, the potential for direct in-combination effects between the application site and current and planned finfish sites is minimal.

The total licenced allowable biomass from the currently licenced sites within the bay is displayed in Table 2-7. All the sites are in the renewal phase of their licences, and have requested amendments to the area and biomass volumes, which are also summarised in this table.

Table 2-7 All current licenced area and tonnage for finfish within Kenmare Bay, compared against proposed applications.

Site	Current licenced area ha	Proposed licenced area ha	% Change	Current licenced tonnage t	Proposed licenced tonnage t	% Change
T06-202	14.48	33.48	+ 131	500	2200	+ 340
T06-064A	4.10	4.10	+ 0	140	175	+ 25
T06-064B	2.50	2.5	+ 0	60		- 100
T06-064-7	22.25	29.01	+ 30	(3800/2) 1900	(3800/2) 1900	+ 0
T05-233	26.6	54.2	+ 104	2200	2200	+ 0
Total	**70.43**	**123.29**	**+ 75 %**	**4800**	**6475**	**+ 35 %**

If all proposed applications are active, there would be a 75% increase in licenced area and a 35% increase in licenced tonnage. It should be noted that the listed tonnage in the above table may not be reflective of actual production for all sites due to various licencing conditions, and 3 of the sites have been fallow for a number of years, so actual production tonnage in the bay may be different than listed above.

All the sites are currently in the licence renewal phase. The modelling submitted with each application shows no interaction between sites and no path for additive effects on water or benthic habitats.

The impacts from parasites and disease are discussed in Section 2.3.5. The Appropriate Assessment Report assessed likelihood of impact occurring to wild Atlantic salmon, concluding that impact is possible, proposing measures to mitigate effects. These measures are:

- To ensure control and management of sea lice numbers on the proposed farm, adherence to *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control* and the *Protocol for Fallowing at Offshore Finfish Farms* should be a mandatory requirement.
- Adhere to the *Strategy for improved pest control on Irish salmon farms* as mandatory requirement.
- In terms of preventing escape incidences from occurring, compliance with the *Protocol for Structural Design of Marine Finfish Farms* should be a mandatory requirement.

These measures apply to all salmon production in the bay. With these in place it will minimise any potential negative effects on wild salmonid populations.

The Appropriate Assessment Report document found the impacts from the site on protected habitats is not considered significant and there will not be a significant cumulative adverse effect on the habitats in the Kenmare River SAC. It also found that the proposed activity does not propose a likely significant threat to the Annex II species in the SAC.

Feedback from the Marine Engineering Division (MED) of DAFM, identify that there is other aquaculture activity including finfish, shellfish and seaweed sites within Kenmare Bay, however it identifies no cumulative impact due to aquaculture activity at the location of this application. It also identifies tourism, fishing and marine leisure in the area, highlighting the need for consultation, and concluding that with no objection to the licencing of this site.

Conclusion

Should the Minister be minded to grant this licence, measures are recommended to mitigate any potential effect to wild Atlantic salmon. These measures, which apply to all salmon production in a bay, are:

- To ensure control and management of sea lice numbers on the proposed farm, adherence to *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control* and the *Protocol for Fallowing at Offshore Finfish Farms* should be a mandatory requirement.
- Adhere to the *Strategy for improved pest control on Irish salmon farms* as mandatory requirement.
- Compliance with the *Protocol for Structural Design of Marine Finfish Farms* should be a mandatory requirement - in terms of preventing escape incidences from occurring.

No other significant cumulative effects from the proposed activity that may have additive or synergistic effects with other activities have been identified.

2.11 Population and human health.

2.11.1 Population

Under section 5.1, the applicant EIAR describes local populations, based on electoral district data (6 EDs), trends, and the breakdown of the workforce. The applicant uses data from the 2016 for the current data and compares this to 2011 Census data for the trends e.g. displayed in Table 5.1. The applicant also outlines the employment supported by the existing operation.

2.11.1.1 MI Supplemental

2.11.1.1.1 Population

Reviewing more recent data from the 2022 Census*, the trends in population and number of permanent dwellings show no significant changes in the population/trends reported in the applicant EIAR. To show the most recent available data (2022*), Table 5.1 from the applicant EIAR has been updated by MI (in Table 2-8), showing the 2011, 2016 and 2022 figures.

Table 2-8. Population of EDs in the vicinity of the proposed aquaculture sites 2011,2016 & 2022. (Source: http://census.cso.ie/sapmap/).

Electoral Division	Total			Males			Females			No. Permanent Dwellings		
	2011	*2016*	*2022*	*2011*	*2016*	*2022*	*2011*	*2016*	*2022*	*2011*	*2016*	*2022*
Ballinskelligs	375	390	*419*	189	195	*212*	186	195	*207*	452	456	*464*
Emlaghmore	926	871	*962*	450	432	*461*	476	439	*501*	750	752	*768*
Lough Currane	269	311	*343*	136	165	*169*	133	146	*174*	289	310	*330*
Ballybrack	93	83	*102*	45	42	*50*	48	41	*50*	99	93	*102*
Darrynane	189	179	*193*	94	86	*92*	95	93	*101*	286	284	*295*
Caherdaniel	312	313	*316*	148	161	*162*	148	152	*154*	433	423	*444*
Total	**2,164**	**2,147**	***2,335***	**1,078**	**1,081**	***1,146***	**1,086**	**1,066**	***1,189***	2,309	2,318	*2403*

**Note: 2022 Census data release dates: Population - June 2023; Housing - July 2023; Employment, Occupations and Commuting – December 2023*

Provided below are the changes in these variables over the period 2016 to 2022 (analysis by the MI).

Table 2-9. Analysis of changes population and dwelling variables over time.

	Population		Dwellings	
ED	**Actual Population Change**	**% Population Change**	**Actual Dwellings Change**	**% Dwellings Change**
Ballinskelligs	29	7.44%	8	1.75%
Emlagh	91	10.45%	16	2.13%
Loughcurrane	32	10.29%	20	6.45%
Ballybrack	19	22.89%	9	9.68%
Darrynane	14	7.82%	11	3.87%
Caherdaniel	3	0.96%	21	4.96%
Total	**188**	**8.76%**	**85**	**3.67%**

The EIAR reports a total population (of the 6 EDs) of 2,147 comprising 850 households. However, on review of this 2016 data[137] the number of households in the 6 EDs listed in 2016 is 835 (in Table 2-10

[137] from the CSO, 2016 Census SAP2016T5T1ED - Private Households and Persons in Private Households

below). Looking to more recent data and trends 2016-2022, population at 2022 has increased by 8.76% to 2335, and the number of households has increased by 14.01% to 952.

Table 2-10 Breakdown of households by Electoral district 2016 and 2022.

	Households			
ED	**2016 # Households**	**2022 # Households**	**Actual Households Change**	**% Households Change**
Ballinskelligs	154	172	18	11.69%
Emlagh	333	381	48	14.41%
Loughcurrane	122	138	16	13.11%
Ballybrack	33	41	8	24.24%
Darrynane	59	82	23	38.98%
Caherdaniel	134	138	4	2.99%
Total	**835**	**952**	**117**	**14.01%**

Of the 6 Electoral Divisions, Emlagh, which is located on the western side of Ballinskellig Bay, has the highest total population at 962, followed by Ballinskelligs (total population of 419). As reported in the EIAR, both communities are reported as the furthest distance from the proposed Deenish site (26.5km via road or 10km visually from coast to the site).

Taking on board this more recent data, there was little change in population level in the Electoral Divisions between 2016 and 2022. Over the period, all 6 EDs show population increases. This is compared to the previous period 2011 – 2016 where 4 of the 6 EDs showed decline, (as reported in the applicant EIAR).

Between 2016 and 2022, Ballybrack showed the greatest change with an increase in population of 22.89%. Increases were also observed in Emlaghmore (10.45%) and Lough Currane (10.29%), Darrynane (7.82%), Ballinskelligs (7.44%) and Cathair Dónall (0.96%). Population decreases, reported in the applicants EIAR for Ballybrack, Emlaghmore, Darrynane using previous Census data, are no longer seen, with these areas now showing population increases.

2.11.1.1.2 Employment

The applicant EIAR states that the operation employs the equivalent of 10.5 full employees on site, and supports several other roles such as contractors, supporting roles and part-timers, referencing 7-11 part-time jobs from the local community. Looking at the 6 EDs in terms of unemployment rates, data from the most recent census (2022) shows higher than average unemployment rates for these 6 EDs compared to the National average (in 4 of the 6 EDs).

2.11.1.1.3 Local Employment

The EIAR concludes that the existing licence and farm has a positive effect on local employment, and that the requested changes will ensure this positive effect is maintained – non-renewal would have a negative effect. The renewal of the licence and approval proposed licence amendments will have no negative effects on the local population, and will have a positive effect on salmon production at the site.

As outlined above, data on employment from the most recent census shows increase in employment in the 6 EDs, however the unemployment rate is lower than the national average.

Table 2-11 Unemployment rates by electoral district, in 2022.

ED	Unemployment Rate 2022
Ballinskelligs	12.07%
Emlagh	8.71%
Loughcurrane	6.54%
Ballybrack	14.55%
Darrynane	2.20%
Caherdaniel	11.92%
Average of the 6 EDs	**9.33%**
National Average	**8%**

2.11.1.1.4 Additional Electoral Divisions

Outside of the 6 EDs in the vicinity, the applicant EIAR also reports on two other EDs: Castlecove and Coulagh in terms of population trends 2011-2016. The location of these EDs is not indicated on the map in the EIAR. Whilst Castlecove is adjoining the 6 EDs outlined in the applicant's map and analysis, Coulagh is on an adjacent peninsula (Figure 2-6). The rationale for including Coulagh ED population data is not clear, but presumably related to current staffing origins.

Looking at more recent data for 2016-2022 for Castelcove, the population levels increased by 13.27% (from 309 to 350) as opposed to decreasing (3.1%) over the previous census period (2011-2016), as reported by the applicant.

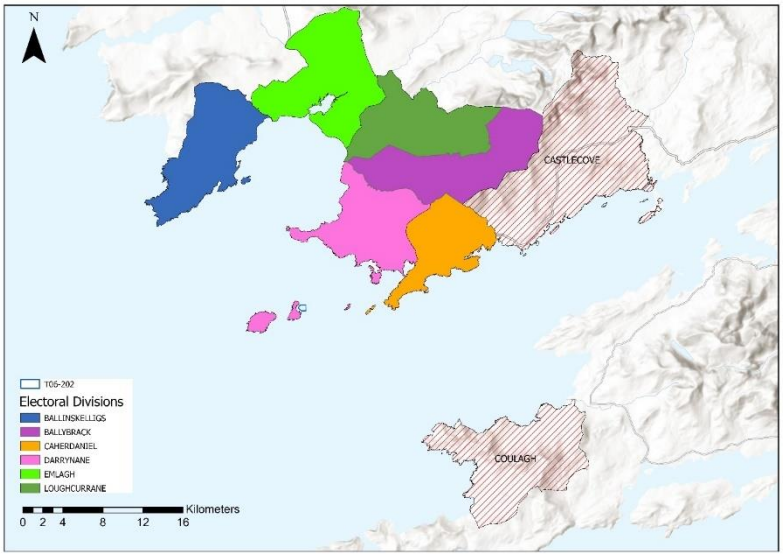


Figure 2-6 Map of electoral districts.

2.11.1.1.5 Local perceptions to aquaculture

The EIAR's description of impacts considers local perceptions to aquaculture, citing numerous opinion polls and studies. The data and references provided in the EIAR are from 1991, 1992 and 2015. The report advises a more in-depth study should be carries out however this is outside of the scope of the EIAR.

The MI notes these studies referenced are relatively dated (especially those from the early 90s). More recent research and programmes have been conducted and are also underway. A 2018 study compared Irish and Norwegian public attitudes towards aquaculture[138]. The results indicate that both the Norwegian and Irish public recognise the potential of aquaculture to create opportunities for employment in coastal areas but opinion is much more divided on some of the more controversial impacts of aquaculture on the marine environment. It notes that aquaculture ranked lower in terms of its perceived threat to the marine environment compared to other industries such as oil and gas, shipping and general industrial pollution, and that the social acceptability of aquaculture amongst the public is strongly linked to its perceived environmental impacts. The results also suggest that the Irish may be less well informed than their Norwegian counterparts in relation to the different types of aquaculture production techniques that are possible and in terms of the issues surrounding fish farm impacts.

In addition, Taste the Atlantic, where BIM are working with Failte Ireland, and the aquaculture industry, are creating awareness of aquaculture along the Taste the Atlantic / Wild Atlantic Way route. A new research project being undertaken by the University of Galway, funded by the Marine Institute,

[138] https://doi.org/10.1016/j.marpol.2018.07.011

on public perception towards Ireland's seas, will develop a framework through which attitudes and values towards seas and oceans can be systematically monitored over time.

2.11.2 Human Health

In the applicants EIAR the receiving environment for human health in the context of the proposed development is considered with respect to those effects to human population and those potential effects to the following factors; water quality, air quality, noise, traffic, socio-economics and tourism (including recreation) and waste management as relevant to human health. The receiving environment for these factors are outlined in other sections of the document (Land and Soils, Water, Air and Climate, Noise and Material Assets).

The document references the SOPs setting out the lines of responsibility for overseeing all operational health and safety systems and emergency procedures, and their Environmental Management Policy which enables the company to contribute to sustainable aquaculture, protect the environment, meet regulatory and corporate compliance obligations, while ensuring safe control MOWI products are delivered, distributed and manufactured. MOWI operate to an Occupational Health and Safety management system (18001:2007 HSAS certified).

The EIAR concludes that the application will not give rise to negative effects on human health, and there will be no significant effects.

2.11.2.1 MI Supplemental

Food safety is an already extensively regulated sector. In their response to consultation, the Sea-Fisheries Protection Authority observe that the proposal will have no negative impacts on seafood safety and hence on human health.

All chemical treatments used at the site will be under veterinary supervision and in accordance with national and European legislation. The company has emergency plans in place for: Fire evacuation; Chemical Spills; Mass mortalities; escape prevention; fish escapes, and; Storm at sea, which outline detailed actions to minimise risk in emergency situations.

In the context of the elements assessed in this report (biodiversity, land, soil, water, air, climate, noise, material assets, cultural heritage, archaeology, landscape, visual impact, and their cumulative impacts), and considering the obligation on the operation to comply with all relevant regulations and legislation, including the reliance on set limits and thresholds which ensures robust and reliable systems for environmental protection and food safety, and considering any impacts identified from this operation, which (when regulation and mitigation are factored in) are not deemed to be

significantly damaging to the ecological health of the environment, for these reasons it is deduced that the proposed operation will not give rise to negative impacts on public health.

2.12 EIA Report Determination

This EIA report supplied by the applicant has concluded that the proposed operations together with the mitigation measures proposed, will not significantly affect the environment.

All conclusions and recommendations from this report are compiled in the Conclusions section of this report, along with any considerations from the consultation process.

3 Prescribed Bodies Consultation

Written submissions on the application were made by the following prescribed bodies:

- Marine Survey Office, Department of Transport (DOT).
- Uisce Eireann.
- Commissioners of Irish Lights.
- Department of Housing, Local Government and Heritage (DHLGH).
- Sea Fisheries Protection Authority (SFPA).
- Inland Fisheries Ireland (IFI) [Note: Statutory consultee but the response was through the Public Consultation process].
- An Taisce [Note: Statutory consultee but the response was through the Public Consultation process].

The principal issues of concern/relevance identified during the statutory consultation process, following an examination of the statutory submissions, are outlined in Table 3-1.

Table 3-1 Summary of issues raised during statutory consultation phase for T06-202.

	DOT	Uisce Eireann	Commissioners of Irish Lights	DHLGH	SFPA	IFI	An Taisce
Navigation and safety	x		x				
Discharge points		x					
Nature conservation				x			x
Impacts on wild fisheries, shellfish growing areas, and seafood safety					x		
Production cycle & Fallow period						x	
Sea lice model & impact on migration routes						x	
Sea lice monitoring & management						x	
Sea lice on wild salmonids						x	x
Salmon, sea trout and pearl mussel stocks						x	
Fish escapes						x	x
Population & human health						x	
Long term sustainability in the context of climate change						x	
Ireland's biodiversity commitments & other plans/projects						x	
Water Framework Directive & water quality							x
Bird impacts							x
Impact threshold and benthic communities							x
Otter							x

Throughout this section, the **Points raised** and **Points addressed by the applicant** boxes use the language and terminology of the responder and the applicant, respectively. The sections headed

Further comments or requests are where the views of the Marine Institute are expressed and clarified. These are primarily those that are relevant to the environment and environmental impacts. Other issues are informed by supplemental information and information provided through the consultation process.

3.1 Department of Transport

The DOT raised no objections from a safety of navigation viewpoint to the application. DOT is pointed out that:

- in order for charts and nautical publications to be updated, if required, the British Admiralty Hydrographic Office is to be informed of the location and nature of the site.
- the applicant is required to apply to the Commissioners of Irish Lights for sanction to establish any lights and/or marks that may be required.

The Applicant responded that, if granted, the new licence boundaries of Deenish site will be notified to the British Admiralty Hydrographic Office. In addition, an application for Statutory Sanction marks will be furnished to the Commissioners of Irish Lights.

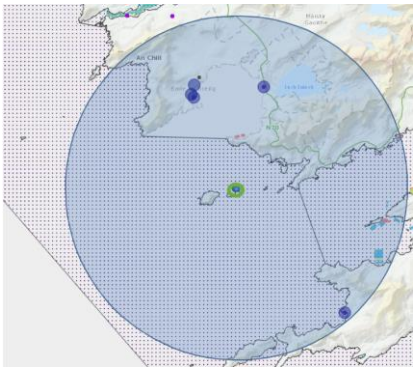
3.2 Uisce Eireann

3.2.1.1 Discharges

Point raised

Uisce Eireann (UI) note that the development is not within a designated shellfish water, but is within the Water Framework Directive Register - South Western Atlantic Seaboard CWB – Shellfish Area. UI identify the coordinates of existing primary and secondary discharges operated by UI, discharging within 10 km and 16 km of the proposed development.

Application No.	Easting	Northing	
T06/202	50112	65881	Within 10km of primary discharge point
T06/202	43400	65088	Within 10km of primary discharge point
T06/202	57205	44223	Within 16km of primary discharge point
T06/202	43170	65376	Within 10km of other discharge point
T06/202	43488	66284	Within 10km of other discharge point



Points addressed by the applicant

We note the information supplied by Irish Water on the existing primary effluent discharges within 10 km and 16 km of the Deenish site.

MI - Further comments or requests

All of the points indicated are distant to the site, and would not be considered hydrographically linked to the proposed aquaculture site.

3.3 Commissioners of Irish Lights

The CIL raised no objections to the renewal of the application. CIL is pointed out that:

- It is important to ensure that no navigable inter-tidal channels are impeded by any structures.
- If the licence is renewed, all structures must be clearly marked as required by Regulations and Licensing Permit conditions and to the approval of the Marine Survey Office.
- Irish Lights bring to your attention the fact that we have no record of this applicant or previous licence holder having applied to Irish Lights for Statutory Sanction for the establishment of Aids to Navigation relating to the licence requirement to clearly mark the structures.
- CIL request that you include the following terms in the licence:
    - That the applicant is required to secure Statutory Sanction from the Commissioners of Irish Lights for the aids to navigation for marking the structures as required by the Marine Survey Office.
- It is recommended that local fishing and leisure interests be consulted prior to a renewal decision being made.
- If a licence is granted, the UK Hydrographic Office must be informed of the development's geographical position in order to update nautical charts and other nautical publications.

The applicant responded that if the licence is renewed, all structures will be clearly marked as required by Regulations and Licensing Permit conditions and to the approval of the Marine Survey Office.

They point out that the previous operator of the Deenish sea farm, Silverking Seafoods, made an application in 2000 to Irish Lights (CIL) for Statutory Sanction for the establishment of Aids to Navigation relating to the Deenish site. They clarify that, in any event, if this licence is renewed, the applicant will apply to CIL to secure Statutory Sanction from the Commissioners of Irish Lights for the aids to navigation for marking the structures as required by the Marine Survey Office.

3.4 Department of Housing, Local Government and Heritage

These points were raised by Department of Housing, Local Government and Heritage (NPWS), who made the observations:

- The proposed salmon culture site is located within Kenmare River SAC and adjacent to Deenish Island and Scariff Island SPA.

- The supporting document has been examined for potential impact on Special Protected Areas and Special Areas of Conservation by relevant scientific staff.
- Observations on the potential interaction of the proposed development on Annex II fish species fall within the remit of Inland Fisheries Ireland and no commentary or observation is provided by the National Parks and Wildlife Service of this Department.

3.4.1.1 Biosecurity threat from brown rat and American mink

Point raised
With regard to the listed species of the aforementioned SPA and particularly with regard to Manx Shearwater and Storm Petrel the assessment reports do not satisfactorily consider the potential impact of the proposed development and associated activities on the listed birds with regard to: • the biosecurity threat to the SPA of potentially introducing predatory mammals such as Brown Rat and American Mink onto the islands of the SPA. If such species became established, they would likely significantly and negatively impact on the breeding birds' survival and productivity rates;
Points addressed by the applicant
MOWI Ireland does not operate any facility on Deenish Island. Feed is delivered in fully sealed one tonne tote bags via truck to our feed warehouse at Travara pier. From there, feed lots are loaded on to our marine vessel for transfer to the floating feed barge at site. The feed is then deposited into enclosed feed silos, below deck. All MOWI Ireland land-based facilities including feed storage, have fully serviced pest management plans in place, which are subject to audit under the various voluntary quality and food safety standards we adhere to. Thus, the threat of ingress from pests such as rodents and mink are minimised. Marine Vessels and Invasive species Wellboats and Specialist Transporters of fish are required to obtain Fish Health Approval (FHA) from the Marine Institute before operating in Ireland in accordance with Article 4(e) of Regulation (EU) 2020/691. Vessels owned or operated by MOWI Ireland, including the MV Aqua Transporter, are registered with the Marine Institute. Refer to the list of approved vessels here https://www.fishhealth.ie/fhu/fish-health-authorisation/irish-aquaculture-productionbusinesses. Operators of these vessels are required to submit a documented biosecurity plan which must apply measures in accordance with EU rules for transporters of aquatic animals, specifically COMMISSION DELEGATED REGULATION (EU) 2020/691of 30 January 2020, supplementing Regulation (EU) 2016/429 of the European Parliament and of Council as regards rules for aquaculture establishments and transporters of aquatic animals. https://eur-lex.europa.eu/legalcontent/AUTO/?uri=CELEX:32020R0691&qid=1658927862300&rid=1
MI - Further comments or requests
The registration and approval procedure as well as the biosecurity measures concerning certain marine vessels, which are referred to by the applicant, relate only to the requirements of Regulation (EU) 2016/429 and Commission Delegated Regulation (EU) 2020/691, concerning the prevention of the spread of diseases of aquatic animals. It should be noted that whilst these requirements are not designed to prevent the introduction/ manage the spread of predatory mammals such as Brown Rat and American Mink, the measures outlined by the applicant, concerning secure feed holdings and pest control, along with the fact that the farm does not operate on the Island as such, minimise the

risk of the proposal being responsible for potential introductions of predatory mammals such as Brown Rat and American Mink onto the islands of the SPA.

3.4.1.2 Impact of lighting

Point raised
With regard to the listed species of the aforementioned SPA and particularly with regard to Manx Shearwater and Storm Petrel the assessment reports do not satisfactorily consider the potential impact of the proposed development and associated activities on the listed birds with regard to: • depending upon the intensity, layout and other characteristics, the lighting of the development has the potential to negatively interfere with the behaviour the Manx Shearwater and Storm Petrel fledglings which depart their natal sites under cover of darkness. Such young birds may get attracted to the lighting of this development thus increasing their chances of depredation by gulls and other predators.
Points addressed by the applicant
Lighting is only deployed on site during low light conditions in winter to allow for safe staff access and egress with no lighting before 08.00hrs and after 17.00hrs daily other than the aids to navigation on site.
MI - Further comments or requests
Lights may present a visual disturbance which can affect, particularly, nesting birds. Disorientation in Shearwater and Storm Petrel have been recorded[139], however impacts appear to predominately effect juveniles and impacts are unlikely to affect breeding seabird species. Distance to the light source and intensity of the light is a factor. Both Manx Shearwater and Storm Petrel migrate in early Autumn, when hours of daylight overlap with the working day. The minor requirement for lighting at the site, confined to working hours and at times of other operational activities, means the potential of temporal overlap of lighting attracting young birds to the proposed project are minimal. There is not likely to be any negative interference. Aids to navigation (AtoN) are addressed in Section 2.3.6. The lights proposed have a 2 mile (3.2km) range. The lighting is yellow with a wavelength greater than 500 nanometres which is above the sensitive range for seabird species[140]. These limited and restricted light sources are not likely to cause significant effect on any sensitive species.

3.4.1.3 Benthic Impact

Point raised
It is noted that mitigation is suggested to ensure organic enrichment does not accumulate beneath the salmon culture site. This fallowing period should be incorporated as a condition of consent and should require monitoring to ensure its efficacy. The assessment documents would be greatly improved if these threats are specifically considered and relevant mitigation and monitoring actions are detailed and subsequently incorporated into the conditions of any licence that may issue with regard to this development.
Points addressed by the applicant
Benthic Impact

[139] Miles, Will, Sarah Money, Richard Luxmoore, and Robert W. Furness. "Effects of artificial lights and moonlight on petrels at St Kilda." Bird Study 57, no. 2 (2010): 244-251.
[140] Syposz et al 2021. Avoidance of different durations, colours and intensities of artificial light by adult seabirds. Nature Scientific Reports 11:18941

As required by Benthic Monitoring Guidelines laid down by the DAFM (December 2008), annual benthic audits are undertaken at the Deenish site to monitor the benthic environment. The benthos at Deenish farm has been surveyed for many years with all reports submitted to the Department of Agriculture, Food and Marine. These audits show that the seabed at the stations located at the edge of the pens and beyond appear to be in good condition and showed no signs of impact from the adjacent finfish activities. The benthic community in the vicinity of the site can tolerate the biomass and the farm operations as proposed which together with the application of a fallow period at the end of each cycle, will not significantly affect benthic ecology.

Results of seabed surveys at numerous sites around the Irish coast and specifically at Deenish Island clearly indicate that this is not the case, with at least polychaete worms being recorded under the pens.

These AQUAFACT surveys include:

- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2023,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2022,
- Environmental Surveys beneath Finfish Pens at Deenish Aquaculture Site T6/202 Kenmare Bay, County Kerry 2021,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2020,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2019
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2018,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2017,
- Environmental Surveys beneath Finfish Pens at Deenish Aquaculture Site T6/202 Kenmare Bay, County Kerry 2016,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2015,
- Environmental Survey beneath Finfish pens at Deenish, Kenmare Bay 2014,
- Environmental Surveys beneath Finfish pens at Deenish and Inishfarnard, Kenmare Bay, County Kerry 2013,
- Environmental Surveys Beneath Finfish cages at Deenish and Inishfarnard, Kenmare Bay 2012,
- Environmental Surveys beneath Finfish cages at Deenish and Inishfarnard, Kenmare River, County Kerry 2011 and
- Environmental Survey of Silver King Seafoods Ltd. Aquaculture Site at Deenish Island, Kenmare River, County Kerry 2008).

At no stage throughout the years did the surveys provide evidence of azoic (no oxygen) conditions. While the effects of organic enrichment were at times evident within the footprint of the pens and out to 10 metres, fauna was always present and there was no evidence of outgassing (methane production that occurs in azoic conditions). Opportunistic species such as the polychaete worms Capitella spp. and *Malacoceros vulgaris* were frequently present in high numbers in this footprint and served to increase bioturbation and oxygenation of the sediment as they feed on the organic matter. Mobile epibenthic scavengers such as fish, starfish and crabs can also help in removing large amounts of organic matter and these were frequently evident within the footprint of the pens.

The Allowable Zone of Effect (AZE) under the benthic monitoring protocols is an area out to 30m from the surveyed pens. At the Deenish site impact was typically evident at the Under and edge pens surveyed and occasionally at the 10m stations. More commonly at the 10m and 20m stations, species that are very sensitive to organic enrichment e.g., the burrowing anemone *Cerianthus lloydii* and the brittle star *Amphipholis squamata* have been recorded. The limited area impacted by the organic enrichment and is reflective of the dynamic nature of the site with mean ebb and flood currents of 0.1m/sec, whilst periods of peak currents of 0.25 – 0.35m/sec during the tidal cycle on both Springs and Neaps. This indicates the potential for rapid dispersal and dilution of settleable solids away from the site, even during still weather conditions.

Fallowing

It is a requirement of all finfish farm licences that sites are fallowed between production cycles. The Deenish farm always fallows after a crop has been harvested. The minimum fallow requirement is

four weeks. In practice the Deenish farm has been fallowed for a minimum period of 8 weeks to a maximum of 24 weeks, over the three most recent crop cycles.

MI - Further comments or requests

This issue is substantially addressed in Section 2.3.2 and 2.3.1. All marine finfish sites are required to comply with *Monitoring Protocol No.1 for Offshore Finfish Farms Benthic Monitoring*.

3.4.1.4 Seals

Point raised

In relation to marine Annex II marine mammal species, the Department has undertaken regular monitoring across all SACs. Where population or count figures are provided in the assessment in order to describe a species' status or other parameters it would be helpful if the most recent information was used and a clear source citation provided. The Department has undertaken annual standardised moult season monitoring of the harbour seal population within Kenmare River SAC since 2009 and there are also substantial local records preceding the current monitoring programme. In addition, aerial surveys of the area were carried out in 2011/2012 and repeated again 2017/2018 (see http://www.npws.ie/marine/marinereports). There are still important data gaps remaining for the site. This is particularly the case regarding:

(a) harbour seal site use throughout the annual cycle and

(b) the spatial and numerical extent of harbour seal breeding (May–July) and post-moult (Oct-Apr) activity.

Points addressed by the applicant

The potential impact of the Deenish Island salmon farm on the harbour seal (*Phoca vitulina*) was considered in the screening for AA exercise and brought forward into the second stage of the Appropriate Assessment. Due to the widespread foraging nature of this species (up to 220 km) four separate SACs were considered in the assessment, including Kenmare River SAC.

Impact mechanisms considered in the NIS included disturbance due to noise, disturbance at seal haul out locations and entanglement. The nearest seal haul out location is located approximately 12 km to the northeast at Cove Harbour. Given this distance it is unlikely that operations at the salmon farm site will result in disturbance effects. Overall, the NIS concluded that the potential impacts identified would have no likely significant effect on the seal population in the Kenmare SAC or indeed in the other SAC's assessed. It should be noted that the purpose of an NIS is to provide the relevant information to the national competent authority who are ultimately responsible for undertaking Appropriate Assessments to determine the potential impact of projects on protected species and habitats.

MI - Further comments or requests

NPWS reports[141],[142],[143] indicate that Kenmare Bay (inner) is an important site for Harbour seal, as are the Blasket Islands. Deenish Island show no records of Harbour seal activity, and being more off-shore this island is less likely to be used by Harbour seals. The CO[144] for Kenmare river indicate know

[141] Lyons D. O. (2004) Summary of National Parks & Wildlife Service surveys for common (harbour) seals (Phoca vitulina) and grey seals (Halichoerus grypus), 1978 to 2003. Irish Wildlife Manuals, No. 13. National Parks & Wildlife Service, Department of Environment, Heritage and Local Government. Dublin, Ireland

[142] NPWS. 2011. Harbour Seal Pilot Monitoring Project, 2010 . Unpublished.

[143] Rakka M & C Minto. 2015. An investigation of the effects of environmental and observational variables on haul-out couints of Harbour seal in Ireland. MFRC, GMIT, Galway. Ireland. 201p

[144] NPWS (2013) Conservation Objectives: Kenmare River SAC 002158. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht

breeding, moulting and resting sites in the SAC. No such sites are indicated at the islands adjacent to the site or within a few km of the site

The Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018[145] report suggests that the populations of both species of seal in Ireland are either stable or increasing in all regions. This survey produced the highest total count of the three (previous) nationwide summer surveys for both species. This survey counted 419 harbour seals in the Kenmare River SAC, compared to 345 in 2011/2 and 391 in 2003.

The Harbour seal is addressed in detail in the Appropriate Assessment Report for this application, with the conclusion that "The likelihood of impact occurring to the QI Harbour seal [1365] is very remote, and the consequences of an impact, if realised, is negligible; it is concluded that there will be no likely significant effects to Harbour seal".

3.4.1.5 Marine Vessels and Invasive Species

Point raised
It is also noted that the movement of the MV Grip Transporter could transport invasive species (such as *Didemnum, Styela, Undaria* etc.). This does not have a thorough examination in the NIS. The assessment documents would be greatly improved if these threats are specifically considered and relevant mitigation and monitoring actions are detailed and subsequently incorporated into the conditions of any licence that may issue with regard to this development.
Points addressed by the applicant
Well-boats and Specialist Transporters of fish are required to obtain Fish Health Approval (FHA) from the Marine Institute before operating in Ireland in accordance with Article 4(e) of Regulation (EU) 2020/691. Vessels owned or operated by MOWI Ireland, including the MV Aqua Transporter, are registered with the Marine Institute. Refer to the list of approved vessels here https://www.fishhealth.ie/fhu/fish-health-authorisation/irish-aquaculture-productionbusinesses. Operators of these vessels are required to submit a documented biosecurity plan which must apply measures in accordance with EU rules for transporters of aquatic animals, specifically COMMISSION DELEGATED REGULATION (EU) 2020/691of 30 January 2020, supplementing Regulation (EU) 2016/429 of the European Parliament and of Council as regards rules for aquaculture establishments and transporters of aquatic animals. https://eur-lex.europa.eu/legalcontent/AUTO/?uri=CELEX:32020R0691&qid=1658927862300&rid=1
MI - Further comments or requests
The registration and approval procedure as well as the biosecurity measures concerning certain marine vessels, which are referred to by the applicant, relate only to the requirements of Regulation (EU) 2016/429 and Commission Delegated Regulation (EU) 2020/691, concerning the prevention of the spread of diseases of aquatic animals. It should however, be noted that whilst these measures are not designed to prevent the introduction or spread of invasive species, they may achieve that objective by virtue of the fact that all vessels which come to Ireland to transport, treat, or harvest aquaculture animals, must first be slipped, cleaned and disinfected. Slipping involves the entire vessel being lifted from the water, so that all organic matter can be removed from the hull. This is followed by cleaning and disinfection. Whilst such procedures are primarily designed to prevent

[145] C.D. Morris & C.D. Duck (2019) Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018. Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland

disease spread, they clearly also assist with removal of any invasive species which may be attached to the hull of the vessel by means of biofouling.

The procedures referred to above apply to all vessels, which the MI has registered to transport aquaculture animals, and all vessels which the MI has approved to treat or harvest aquaculture animals. Aquaculture establishments may only use vessels which have been registered or approved (as relevant), by the MI.

3.5 Sea Fisheries protection Authority

The SFPA comment on:

- The possible impacts, if any, on existing wild fisheries in the area, with an emphasis on the possible implications for the SFPA conducting official controls and possible non-compliance issues that could arise.
    - No negative impacts on existing wild fisheries in the area and no foreseeable implications for the SFPA conducting official controls and possible non-compliance issues that could arise.
- The impacts, if any, on shellfish growing areas adjacent to or within the area and the possible impact on the ability of the SFPA to conduct official controls and possible non-compliance issues that could arise.
    - No negative impacts on shellfish growing areas and no foreseeable implications for the SFPA conducting official controls and possible non-compliance issues that could arise.
- The possible impacts, if any, on seafood safety.
    - No negative impacts on seafood safety.

3.6 Inland Fisheries Ireland

3.6.1.1 Proposed Production Cycle & Fallow period

Point raised
Fallowing According to the consultation documentation, the proposal for the farm is to have a production cycle of 24 months long that includes fallowing which will operate under a policy of strict separation of generations, with an 'all in all out' model (fish are added to pens and there is no movement from time of entry to time of harvest) and no movement of fish during the grow-out phase. The production cycle at the site will be 24 months long beginning in March and includes fallowing of the site during the winter months of the second year (December – February) or a minimum of one month after harvest. The proposed fallowing period is unclear in the consultation documentation. For instance, in Section 2.1.11.4 of the Screening for Appropriate Assessment and Natura Impact Statement Volume 1 – Main Report the fallowing period is stated as, "the Deenish site will lie fallow for a minimum of one month following the completion of harvest." However, elsewhere including

in the EIA Volume 2 – Main Report it is stated that the site will be fallow for three months at the end of the harvest period. The consultation documentation further states that the fallowing of the site at the end of harvest will see no smolts present at the site which will allow time for the marine environment to recover and rest between cycles and input of the next generation of smolts.

Wild salmonids & Fallowing

The consultation documentation states that it is intended that c. 650,000 smolts with an average weight of 75 g will be added to the pens in March at the beginning of the 24-month production cycle, that these will grow out to a c. mean weight of 2.5 kg in approximately 13-14 months post-transfer and thereafter, will be counted, graded and redistributed among the pens in preparation for harvest. In addition, the proposed site is projected to hold a maximum total biomass on-site of c. 2,200 tonnes at a peak stocking density of ≤10kg/m3 of salmon with peak biomass occurring between June and July of Year 2 in each production cycle and the mean harvest weight is expected to range between 4.5 and 5.6 kg with harvesting taking place in the period July to December approximately 16 or 17 months after the smolts were initially transferred to the site.

The production cycle set out above will approach peak biomass from late spring to mid-summer which overlaps with wild salmonid smolt runs which typically occur from late March to early June. The biennial fallow period proposed from December to February (or for a "minimum of one month following the completion of harvest") will be of little benefit to wild salmonids as:

1) a fallow period immediately prior to and during the principal period of wild smolt runs over the March to May period is somewhat more likely to better protect wild fish from sea lice infestation emanating from the farm; and
2) there will be no such fallowing in year 2 of the production cycle.

Harvesting will also likely take place in late summer which will impose increased sea lice infestation pressure on wild salmonids as fish will presumably be subjected to a period of starvation prior to harvest during this time. This starvation period will likely preclude chemical treatment, if high sea lice infestation levels warranting treatment are breached. With the efficacy of cleaner fish that may instead be present to control lice levels under such a scenario unclear, heightened sea lice levels may prevail and pose substantial risks to wild salmonids. IFI are particularly concerned that this has the potential to negatively impact wild salmonids (Atlantic salmon and sea trout) and indeed, this has been well documented in numerous published studies in Ireland and elsewhere as set out herein. It is also of particular concern to Ireland's under-threat sea trout stocks which commonly inhabit the coastal environment during their marine phase. Recent acoustic tagging data for sea trout smolts from the adjacent Currane catchment undertaken by IFI has shown that post-smolts utilise the waters around Deenish Island. Therefore, from a wild fish perspective, the proposed production cycle poses considerable threat to out-migrating wild salmon smolts and indeed, post-smolt and adult sea trout. Further observations in relation to the proposed operation are made in some of the following sections on the risk of sea lice associated with salmon farming to the continued sustainability of wild salmonids stocks.

A further point to note, is that the use of the term "biannual" in the consultation documentation in relation to the stocking of smolts is confusing and potentially misleading as it means that smolts will be stocked twice a year. This is at odds with the production cycle stated elsewhere.

Points addressed by the applicant

As is required in all finfish farm licences, the Deenish farm always fallows after a crop has been harvested. The minimum fallow requirement is four weeks per production cycle. In practice the

Deenish farm has been fallowed for a minimum period of 8 weeks to a maximum of 24 weeks, over the three most recent crop cycles.

IFI states that the proposed harvest period from March – July will impose increased lice infestation on wild salmonids. This is incorrect as lice on farmed fish will continue to be controlled both with cleaner fish (wrasse) and with hyposaline baths. Both these methods are very effective in treating not only adult lice but also all juvenile lice stages (McDermott *et al*., 2021).

IFI also states that the proposed production cycle poses a considerable threat to out- migrating salmon smolts in spring. This again is incorrect as outwardly migrating smolts from the nearest rivers to the Deenish salmon farm, the Emlaghmore, Inny and Currane/Waterville Rivers, will swim ca 5 km northwest from the farm site towards the open sea . It is also known that salmon smolts swim directly out to sea and do not remain in coastal, inshore waters. Costelloe et al. (1996b) shows that within ca 1km from a salmon farm, due to dilution and dispersion effects, larval densities decline to what is regarded as a background density of ca 1 larva/4m³ or 0.25 larva/m3. For these reasons, it is not possible that the smolts will be subjected to any higher levels of lice to which they are naturally subjected.

Fallowing - As is required in all finfish farm licences, the Deenish farm always fallows after a crop has been harvested. The minimum fallow requirement is four weeks. In practice the Deenish farm has been fallowed for a minimum period of 8 weeks to a maximum of 24 weeks, over the three most recent crop cycles. Refer to the Fallowing of Offshore Fish Farms protocol https://www.gov.ie/en/publication/fcd20-aquaculture-foreshore-management/#marinefinfish-protocols

MI - Further comments or requests

The *Monitoring Protocol for Fallowing at Offshore Finfish Farms, 2000* requires that all production sites are fallowed annually for a minimum of 30 continuous days, which is satisfied by the stated fallowing period in the documentation, where they will fallow for in excess of the 30-day statutory minimum, with an expected fallow period of 8 weeks. Adherence to the Fallowing protocol, or any future revised versions, will be a mandatory condition of the licence.

Impacts on salmonids are addressed in other sections in the document.

Note – although a more correct term is biennial, the term biannual can refer to occurring twice a year or occurring every two years and is commonly used for both. The latter is the meaning in this report as is clear from the production plan detailed.

3.6.1.2 Deficiencies in sea lice model & impact on migration routes

Point raised

Deficiencies in sea lice modelling to assess risks to wild salmonids

Modelling was undertaken to examine the transport and fate of farm origin lice which may be released from the proposed site of operation. The purpose of the modelling was to ascertain if farm origin lice were capable of reaching estuaries or migration routes in sufficient numbers to infest wild stocks. The numerical model utilised particle-tracking analysis to simulate the dispersal of the lice larvae from the farm sites.

However, the fidelity of the model simulations to actual hydrodynamic conditions in Kenmare Bay are not satisfactorily conveyed. That is to say, to have confidence in the output of the model, it is essential to validate it against different observations. The model methodology as currently outlined in section 5.1 Appendix 7 is unlikely to stand-up to standard scientific peer-review without major revisions. For example, the results from the hydrodynamic model are vaguely compared as “reasonable” to a single 1997 drogue survey yet it is also stated that the drogue releases were strongly influenced by winds

that occurred specifically during that brief survey. Therefore, it is unclear how representative this is of year-round hydrodynamic conditions in Kenmare Bay, with variable (time-varying) wind conditions.

Furthermore, drogue surveys are only representative of surface currents whilst figures of mid-depth and bottom current velocities are also shown without rigorous model validation. The minimum acceptable criteria for quantifying the accuracy of a hydrodynamic model would be to give at the very least some statistical quantification of model error (e.g. Root Mean Square Error & Mean Absolute Error) by comparing model simulations to in-situ- observations of water currents at different depths throughout the water column (e.g. observations obtained from an acoustic current profiler) and/or hydrographic properties (observations obtained from temperature/salinity profiles), carried out over meaningful time periods (seasonal and interannual). Without such statistical measures of model performance, it is not possible to objectively evaluate the accuracy of the hydrodynamic model described in the EIA and subsequently used to model lice dispersion. The statement in section 5.1 of Appendix 7 that: "The predicted hydrodynamics are considered to reasonably reproduce the mixing characteristics of the Bay and the [sic] generally reflect the moderately slack flow conditions at the mouth of Kenmare Bay" is unsubstantiated and not validated using any observational data.

The modelling of dispersal of sea lice from Deenish as submitted by MOWI is certainly flawed as the following study carried out by the Marine Institute and MOWI demonstrated substantially different outcomes. The study demonstrates a radically different outcome and the modelling presented in the NIS as submitted by MOWI should be viewed as unreliable and misleading. It should be noted that the Marine Institute study is a physical study rather that a computer generated study.

Points addressed by the applicant

Impacts of Sea lice

The IFI document makes several references to the impacts of sea lice, presumably emanating from salmon farms, on salmonids without any supporting empirical evidence to support such potential interactions and indeed, the document makes no reference to publications that indicate the potential for this to occur is low e.g., a Norði et al.,2015[146]; Byrne et al., 2018[147]; Costelloe et al.,1995[148]; Costelloe et al., 1996a[149]; Costelloe et al., 1998a[150]; Costelloe et al., 1998b[151]; Crosbie et a., 2019[152]; Morton et al., 2011[153]; Nelson et al.,2017[154].

Hydrodynamic model used

The model used to predict the hydrodynamic conditions in the vicinity of the Deenish Island salmon farm and in the wider area of Outer Kenmare Bay is known as TELEMAC which was original developed

[146] a Norði, G., Simonsen, K., Danielsen, E., Eliasen, K., Mols-Mortensen, A., Christiansen, D., Steingrund, P., Galbraith, M, and Patursson, Ø. 2015. Abundance and distribution of planktonic Lepeophtheirus salmonis and Caligus elongatus in a fish farming region in the Faroe Islands. Aquaculture Environment Interactions. 7, 15-27

[147] Byrne, A., Pearce, Cross, S., Jones, S., Robinson, S., Hutchinson, M., Millar, M., Haddad, C., and Johnson, D. 2018. Planktonic and parasitic stages of sea lice (Lepeophtheirus salmonis and Caligus clemensi) at a commercial Atlantic salmon (Salmo salar) farm in British Columbia, Canada. Aquaculture. 468, 130 – 138

[148] Costelloe, J., Costelloe, M. and Roche, N. 1995. Variation in sea lice infestation on Atlantic salmon smolts in Killary Harbour on the West Coast of Ireland. Aquaculture International, 3: 379 – 393.

[149] Costelloe, M., Costelloe, J., Coghlan, N. and O'Connor, B. 1996a. Studies on sea lice larvae

[150] Costelloe, M., Costelloe, J., Coghlan, N. O'Donohoe, G., and O'Connor, B. 1998a. Distribution of
the larval stages of Lepeophtheirus salmonis in three bays on the West coast of Ireland. ICES Journal of Marine Science, 55: 181 – 187

[151] Costelloe, M., Costelloe, J., O'Donohoe, G., Coghlan, N. Oonk, M. and van der Heiden, Y. 1998b. Planktonic distribution of sea lice larva, Lepeophtheirus salmonis Killary Harbour, West coast of Ireland. Journal of Marine Biological Association, U.K. 78: 853 – 874.

[152] Crosbie, T., Wright, D.W., Oppedal, F., Johnsen, I.A., Samsing, F. & Dempster, T. 2019. Effects of step salinity gradients on salmon lice larvae behaviour and dispersal. Aquaculture Environment Interactions 11: 181-190.

[153] Morton, A., Routledge, R., McConnell, A., and Krkošek, M. 2011. Sea lice dispersion and salmon survival in relation to salmon farm activity in the Broughton Archipelago. ICES Journal of Marine Science. 68: 144 - 156.

[154] Nelson, E. Robinson, S., Feindel, N., Sterling, A., Byrne, A., and Pee Ang, K. 2017. Horizontal and vertical distribution of sea lice larvae (Lepeophtheirus salmonis) in and around salmon farms in the Bay of Funday Canada. Journal of Fish Diseases. 41: 855 – 899

by the Laboratoire National d'Hydraulique, a department of Electricité de France's Research and Development Division (see Galland et al., 1991).

The software is maintained by the OPEN Telemac-Mascaret Consortium (www.opentelemac.org). This is a partnership of the following users and developers:

• Electricite de France (France) ;

• SOGREAH (France) ;

• HR Wallingford (UK) ;

• Centre d'tudes Techniques Maritimes et Fluviales (France) ;

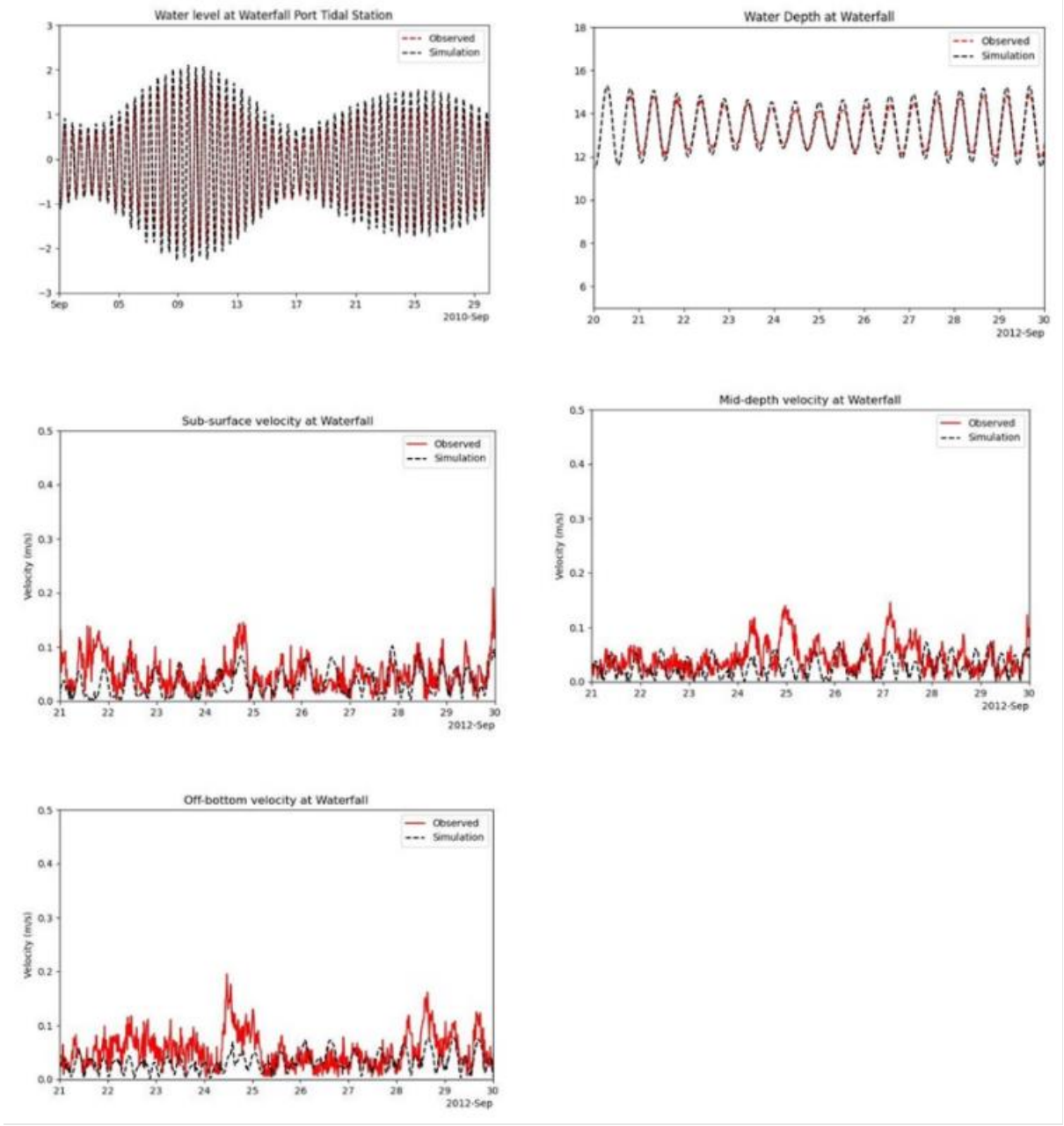
• Bundesanstalt fur Wasserbau (Germany).

• Daresbury Laboratory (UK).

Since its inception TELEMAC has been used extensively around the world to model hydrographic processes in shelf, coastal and estuarine environments and has become one of the major standards of computational modelling of free surface flow in its field. TELEMAC is built on sophisticated algorithms that use a finite-element approach to perform numerical simulation on an unstructured triangular mesh (Hervouet, 2007). This allows complex coastlines and estuaries to be represented more accurately than using regular grids.

The outputs from the model have also been extensively validated against in situ data and peer review. For example, TELEMAC, is used extensively in the UK National Network of Regional Coastal Monitoring Programmes and models produced are routinely validated against the network of tidal gauges and wave observation stations maintained by the Network.

The TELEMAC model has also been used extensively in Ireland to model water quality, water currents, tidal heights and sediment transport in a variety of environments including lagoons, estuaries, coastal waters, harbours and ports. These individual studies often include comparisons to measured, in situ data, for example on tidal heights and water velocities. Most recently, TELEMAC was used to model the hydrodynamics of Bantry Bay in southwest Ireland with the outputs of the model showing very good agreement with measured current velocity data measured at different depths and variation in tidal height and water depth (see the figures below)



It can be concluded that the TELEMAC model is an effective tool for accurately modelling tidal elevation and water velocity and given that tidal forcing is by far the most important physical attribute causing water movement and the dilution and dispersion of solutes e.g., nitrogen, phosphorus and therapeutics, it is not surprising that modelled output values of such parameters are in close agreement with measured data.

Sea lice modelling

The outputs from the 3-D hydrodynamic model produce results which are in very good agreement with in-situ observations of sea lice densities across several different locations in Ireland and in other countries. This indicates that the model has effectively predicted the concentration of sea lice larvae emanating from the salmon farm. The dramatic decline in sea lice numbers as one travels away from the farm site is also consistent with empirical evidence.

Morton et al. (2011) report larval lice densities from the west coast of Canada (Broughton Archipelago) as ranging from < 0.1 m^3 - < 0.4 m^3 and state that there were no lice in samples from control sites or

sites with pens but no fish. á Norði et al. (2015) present abundant data on planktonic stages of L. salmonis in a salmon farming region in the Faroe Islands and record densities of 0 m^3 for nauplii and 0 – 0.21 m^3 for copepodids. Nelson et al. (2017) studied the distribution of L. salmonis around salmon farms in the Bay of Fundy, Canada and recorded larval densities of 1.5 m^3 at the edge of the farm and 0.4 m^3 100 m away from the farm. They also recorded densities of 0.5 m^3 at a reference site. Byrne et al. (2018) examined larval densities of L. salmonis at a salmon farm in British Columbia, Canada and record densities of c. 1 m^3 both in the farm and at a reference site. Adams et al. (2021) worked on L. salmonis abundances in a bay with salmon farms in the northwest coast of Scotland and recorded naupliar densities ranging from 0 – c. 0.6 m^3 and copepodid densities from 0 – c. 3.5 m^3.

In Ireland, Costelloe et al. (1996;1998) were the first to publish data on this topic and they recorded densities ranging from c. 70 larvae/m^3 within the pens, to c. 3 larvae/m^3 outside the pens, to c. 1 larva/m^3 100 m away from the pens and less than 1 larva/m^3 1 km away from the farm. They speculate that currents speeds within pens is lower than the surrounding waters due to:

1. The mesh of the pens,

2. Any biofouling on the mesh and

3. The concentrated biomass of the farmed fish.

The larval Lepeophtheirus densities recorded by Costelloe et al. (1988) are like those recorded more recently by Morton et al (2011), á Norði (2015), Nelson et al., (2017), Byrne et al., (2018) and Adams et al. (2021).

These values are relatively like one another, and they also cover a broad geographical extent ranging from the northeast to the northwest Atlantic and further west to the northeast Pacific, all these data show that outside the farm area, larval densities are low. This very much follows a simple dilution model with increased distance from the source. It is considered that because these data are so like one another and cover such a broad geographic extent, they are suitable to be used as model validation data.

As the output data of the hydrodynamic model regarding predicted larval densities fall within the range of the empirical data, it is clear therefore that the model is generating valid data. Another important reason why larval densities outside pens are low is that once the copepodid stage has been reached (which is the first potentially infective stage (Hamre et al., 2013)), the larvae can then metamorphose directly into the adult stage and infect the fish in the pens.

They do not therefore have to go through the other larval stages and do not leave the pen. Given all the above, the arguments raised by IFI regarding the impact of lice from salmon farms on wild salmonids fall are not in any way supported by numbers of sea lice larvae escaping from the farm.

MI - Further comments or requests

Whilst TELEMAC is a widely used and recognised numerical model and an application of its 3D version is appropriate in this region, it should be noted that validation plots for the currents are not presented in the EIA. The above Figures included in the response by the applicant concern a different model domain, namely the Bantry Bay. There is no guarantee that the TELEMAC model of Kenmare Bay used in this EIA represents currents equally well. Reference is made to previous surveys carried out in 1990 and 1997 and statements are made that the model agrees reasonably well with the findings from those surveys. However, this statement is not supported by any figures comparing the observed currents and modelled currents at specific locations and specific stages of the tide or weather conditions. It is thus difficult to verify to what extent the modelled currents agree with those observed.

Section 3.2 of Appendix 8: A hydrographic survey of the tidal currents in outer Kenmare Bay carried out by Irish Hydrodata (Aug 1990) indicated weak tidal stream velocities throughout the outer bay area and under the slack tidal streams that characterise the outer Kenmare Bay area, the dominant influence on hydrodynamics will be meteorological conditions in respect to variable wind conditions. The mean wind condition is a 5.5m/s wind speed from the southwest. The hydrodynamic model and

dispersion modelling that underly Section 8.2 Impacts on Water Quality lack wind forcing, which is an important component. It is therefore important to include wind forcing in the numerical modelling study in this area. The coastal waters in the southwest of Ireland is a region known for upwelling events. In the neighbouring Bantry Bay we do observe upwelling and downwelling events, whereby near-bed and surface waters, respectively, are transported into the bay. These events are wind-driven and the lack of wind forcing in the model is considered a serious shortcoming.

Whilst wind generated currents would likely cause quicker dispersion, i.e. more dilution and thus lower concentrations (in the context of EQS), they may at the same time transport water masses over longer distances, which is an important consideration in the sea lice dispersion study. However, wind forcing was not applied in the model underlying sea lice dispersion assessment.

With regard to local impacts, e.g. nutrient enrichment, the lack of wind forcing can be deemed acceptable, as it will result in less dispersion and thus a worse-case scenario than it will be in reality. However, as regards far field effects e.g. sea lice dispersion, then the lack of wind forcing is a shortcoming. For example, under sustained wind, a plume of water containing sea lice can be quickly transported over a large distance if sea lice are present at the surface. However, one can only speculate on the distance without measuring or modelling it. The applicant states that "the dominant influence on hydrodynamics will be meteorological conditions in respect to variable wind forcing" and then surprisingly do not account for it in the model. This is deemed as a serious shortcoming, as the presented model may not represent hydrodynamics well. We are not presented with any validation figures that would suggest that the presented model without the wind forcing is acceptable and raises questions regarding the accuracy of the model.

Models are used to provide an estimate of risk in order for the regulators to come to a decision on the acceptability, or not, of that risk. Models therefore need to provide a close representation of the observations of the underlying processes at play and their interactions. While we conclude that it is deemed reasonable to assume that planktonic lice stages are positively buoyant (Section 3.6.1.2.2**)**, in areas without strong haloclines, we also conclude that wind forcing then becomes a more important factor which should be included. Wind-forced surface currents could potentially transport planktonic sea lice stages over relatively large distances (i.e. compared to tide only) and while it may tend to disperse them over a larger area and so dilute the density in the water column, we cannot rule out the possibility of it also concentrating them at near-shore areas such as the mouths of rivers and putting them into contact with migrating salmonids.

Comment on 'study carried out by the Marine Institute'.

It is unclear which 'study' performed by the Marine Institute is being referred to and what is meant by 'a physical study'. For the purpose of this report, we assume that the study in question refers to work done for the AquaPlan[155] project. Within this project, a prototype disease transport model was developed and run weekly for a period of 12 months. Within the model, Lagrangian tracks (floats) were released every two hours from 23 sites over the first two days of each week and then tracked for the rest of the week with a lifespan for each float of five days. The information collected was then used to develop statistics about the overall transport of a potential generic pathogenic organism, with the aim of providing information for the development of epidemiological units. The methodology used in no way reflects the life cycle of the salmon louse and it is therefore not appropriate to use the outputs of the model to determine risk related to the spread of planktonic stages of the salmon louse from salmon farms.

3.6.1.2.1 Wind forcing

Point raised

[155] Ruane N, Geoghegan F, Rodger H, Murphy K & O Sullivan C. 2015. AQUAPLAN: Health management for finfish aquaculture (PBA/AF/08/003(01)). Marine Research Sub-Programme 2007-2013, Marine Institute, 34 pp.

Finally, and perhaps most pertinently, the boundary conditions used to force the hydrodynamic model, which in turn was utilised to predict lice dispersion, did not use wind data (see section 2.2 Boundary conditions and section 4.1. under 4 Water Quality Dispersion Modelling – only tidal forcing (namely tidal elevation and velocities) were specified. Specific use of Valentia wind data only appears to have been used in section 3.3, to derive extreme wind conditions with a 50-year (or greater) return interval specifically for the purposes of assessing the exposure of the fish farm to damage from extreme wave events). This is particularly troublesome when considering the ability of the model to simulate realistic lice dispersal in the region, as wind-driven surface circulation is the dominant influence on the dispersion of surface particles, including the distribution of sea lice, which tend to occur at depths of 0-4 m from the surface. In addition, the particle tracking model used lice discharge at mid-cage depth (> 4m below the surface) which is unlikely to capture the primary mode of lice dispersion, which are typically constrained to surface layers. As shown in Figure 17 of Appendix 7, the predominant wind climatology in the region is comprised of winds coming from the south-southwest-west meaning that the primary direction of surface particle dispersion from the Deenish site would be landward and greatly increase the exposure of salmonid smolts leaving river mouths to sea lice infestation. This same concern also relates to other farm-related water quality issues (soluble pollutants, nitrogen, phosphorus & BOD), all of which may compromise nearshore water quality impacting migrating salmonids and other inshore biodiversity. Before any firm conclusions can be drawn about the insignificance of fish farm lice dispersals (e.g. section 3.5.3.3), a hydrodynamic model should be presented with appropriate quantification of model performance and incorporating realistic wind-driven surface currents in this region. Some examples of the requisite scientific rigour associated with executing and validating such lice-dispersal models (and highlighting the requirement for wind-forcing data) include: Gillibrand and Willis (2007); Amundrud and Murray (2009); Salama et al. (2018); Skarðhamar et al. (2018); Asplin et al. (2020); Cantrell et al. (2021); and Murray et al. 2022.

Points addressed by the applicant

Wind forcing may result in a more complete picture of the spatial distribution of sea lice larvae, but it will also lead to the further dilution of sea lice densities which are already well below background levels (less than 0.1 larvae/m^3) a short distance from the farm site. The same point can be made about the concentration of the water quality parameters (nitrogen, phosphorus and BOD): wind forcing is likely to result in the concentration of these parameters being further diluted.

In effect, the tidally forced model produces a more conservative view of larval densities and water quality parameters with wind forcing resulting in reduced larval densities and water quality parameter concentrations and a reduced impact of the Deenish Island salmon farm on the surrounding marine environment.

It should also be noted, as was indeed noted in the IFI document, that sea lice are capable of some form of vertical movement in the water column. It follows therefore that wind forcing will be less important if this is the case and indeed larvae have the capacity to move away from the surface layer. Furthermore, lice larvae may also become 'trapped' at discontinuities such as pycnoclines and thermoclines, which further emphasises the importance of subsurface flows, which are determined more by tidal forcing, in determining larval distributions.

MI - Further comments or requests

This issue is addressed in the previous sections.

On wind forcing specifically, if the sea lice are near the surface, then wind-forced surface currents could potentially transport them relatively large distances (i.e. compared to tide only), but it would

also tend to disperse them over a larger area and so dilute the density in the water column. Possibly a limitation of the modelling approach is not to consider discrete events where periods of strong winds might temporarily raise sea lice densities downwind of the site. These events are likely to be random and occasional and their importance in the overall context should be weighed up.

However maintaining salmon lice levels at near zero would negate this as there would be few or no larval stages to disperse. Given the effective sea lice management on site there is no evidence to suggest that sea lice emanating from the site pose a risk to wild salmonids.

3.6.1.2.2 Particle Tracking

Point raised
Furthermore, the fundamental premise of the particle-tracking model assumes that sea lice particles are passive ("treated as passive particles being advected and dispersed by the ambient currents"), where in reality they are not. Sea lice exhibit a vertical movement in the water column and therefore, consideration of the vertical position of sea lice in the water column is necessary in order to simulate realistic lice dispersal. It is known that sea lice in the water column can avoid freshwater layers, move towards host fish, away from predators and are attracted to light near the surface during the day and sink away from the surface during the night. It is important to consider the active vertical behaviour of sea lice in the water column as a component of any model as it will influence dispersal where typically currents are not uniform across the water column. Assuming that sea lice are passive particles is an incorrect assumption to make and thus compromises the output of the sea lice particle tracking simulations in providing an accurate reflection of their potential dispersal in the wider area (Murray et al. 2022). Indeed, the EIA Section 6.5.3. Sea Lice states, "Copepodids have limited strategies to assist in seeking out hosts. They can dart by up to 10cm on sensing a passing host fish. They may also be able to adjust their position in the water column, sinking towards the seabed in response to the ebbing tide (geotaxis), to assist in maintaining their position and population density, close to estuaries and inshore margins, through which their target hosts migrate".
Points addressed by the applicant
The model treats the larvae as passive particles whose distribution is determined by the hydrodynamics of the three-dimensional model. Providing the particles with behavioural characteristics (i.e., the ability to vertically migrate in the water column) and life-cycle characteristics would more than likely improve the accuracy of the model in predicting the spatial distribution of larvae emanating from the farm. However, improved modelling of sea lice behaviour is unlikely to significantly change the fundamental outputs of the model which show that relatively low source inputs of larvae from the farm are quickly diluted and dispersed by tidal currents and reach densities that are like background concentrations observed in reference sites without salmon farms.
MI - Further comments or requests
Models need to provide a close representation of the observations while being as simple as possible to give a clear vision of the underlying processes at play and their interactions. Initially, models had treated the planktonic stages of lice as neutrally buoyant particles based on studies which showed that infestations of lice primarily occur at depths of 0m to 4m (Hevrøy et al., 2003[156]). These models assumed that sea lice dispersal is mainly achieved by circulation of surface water since their

[156] Hevrøy EM, Boxaspen K, Oppedal F, Taranger GL & Holm JC. 2003. The effect of artificial light treatment and depth on the infestation of the sea louse Lepeophtheirus salmonis on Atlantic salmon (Salmo salar L.) culture. Aquaculture 220: 1-14.

swimming capacity is limited compared to the horizontal advection of currents (Murray & Gillibrand, 2006[157], Amundrud & Murray, 2009[158], Jackson et al., 2012[159]). Sea lice modelling has gradually increased in complexity by incorporating a range of more realistic biological behaviours based on recent studies investigating nauplii and copepodid responses to environmental parameters (Crosbie et al., 2019[160], 2020[161], Szetey et al., 2021[162]. These studies can give new insights into how sea lice behaviour can impact dispersion patterns; however they will require further experimental studies and validation in order to determine whether they actually improve model predictions (ICES, 2020[163], Stige et al., 2021[164].

Studies in Norway showed a shorter dispersion distance for sea lice fixed at the surface compared to those that applied diel vertical migration (Johnsen et al., 2014)[165]. Amundrud & Murray (2009) found that as long as sea lice experience surface circulation, introducing a diel vertical migration behaviour produced a horizontal dispersion pattern that did not differ much to the one resulting from particles transported by surface motion. Local winds were found to be the dominant influence on the dispersion patterns of the particles in this study. However, since fjordic systems in Norway and Scotland often experience stratified water and wind-driven circulation with strong current shear of surface water (Murray & Gillibrand, 2006[166], Asplin et al., 2014[167]), vertical migration behaviour should be considered for horizontal dispersion of sea lice in these systems.

In areas without strong haloclines it is deemed reasonable to assume that planktonic sea lice stages are positively buoyant maintaining themselves in surface waters (Murray et al., 2022[168]).

3.6.1.2.3 Migration Routes

Point raised
Further to this, no specific consideration was given to the potential migration routes and residence areas of salmon and sea trout in the wider area around the proposed operations which is a key consideration when assessing potential impacts on wild salmonids from increased sea lice loads associated with the salmon farm.
Points addressed by the applicant
IFI note that no specific consideration was given to the potential migration routes and residence areas of salmon and sea trout in the wider area around the proposed site.

[157] Murray, A.G. & Gillibrand, P.A. 2006. Modelling salmon lice dispersal in Loch Torridon, Scotland. Marine Pollution Bulletin 53: 128-135.
[158] Amundrud, T.L. & Murray, A.G. 2009. Modelling sea lice dispersion under varying environmental forcing in a Scottish sea loch. Journal of Fish Diseases 32: 27-44.
[159] Jackson D, O'Donohoe P, Kane F, Kelly S, McDermott T, Drumm A, Lyons K & Nolan G.. 2012. Result of an epidemiology study of sea lice infestation in South Connemara, West of Ireland. Aquaculture 364-365: 118-123.
[160] Crosbie T, Wright DW, Oppedal F, Johnsen IA, Samsing F & Dempster T. 2019. Effects of step salinity gradiants on salmon lice larvae behaviour and dispersal. Aquacultue Environment Interactions 11: 181-190.
[161] Crosbie T, Wright DW, Oppedal F, Dalvin S, Myksvoll MS & Dempster T. 2020. Impact of thermoclines on the vertical distribution of salmon lice larvae. Aquaculture Environment Interactions 12: 1-10.
[162] Szetey A, Wright DW, Oppedal F & Dempster T. 2021. Salmon lice nauplii and copepodids display different vertical migration patterns in response to light. Aquaculture Environment Interactions 13: 121-131.
[163] ICES. 2020. Working group on environmental interactions of aquaculture (WGEIA). ICES Scientific Reports 2: 112.
[164] Stige LC, Helgesen KO, Viljugrein H & Qviller L. 2021. A statistical mechanistic approach including temperature and salinity effects to improve salmon lice modelling of infestation pressure. Aquaculture Environment Interactions 13: 339-361.
[165] Johnsen IA, Fiksen Ø, Sandvik AD & Asplin L. 2014. Vertical salmon lice behaviour as a response to environmental conditions and its influence on regional dispersion in a fjord system. Aquaculture Environment Interactions 5: 127-141.
[166] Murray, A.G. & Gillibrand, P.A. 2006. Modelling salmon lice dispersal in Loch Torridon, Scotland. Marine Pollution Bulletin 53: 128-135.
[167] Asplin L, Johnsen IA, Sandvik AD, Albretsen J, Sundfjord V, Aure J & Boxaspen KK. 2014. Dispersion of salmon lice in the Hardangerfjord. Marine Biology Research 10: 216-225.
[168] Murray AG, Shephard S, Asplin L, Adams T, Ådlandsvik B, Gallego A, Hartnett M, Johnsen IA, Jones SRM, Moriarty M, Nash S, Pert CC, Rabe B & Gargan PG. 2022. A standardised generic framework of sea lice model components for application in coupled hydrodynamic-particle models. In Sea Lice Biology and Control, J. Treasurer, I. Bricknell & J. Bron (Eds). 5M Books, Great Easton, p 167-187.

Regarding returning salmon, it is thought that the fish seek out the scent of their nascent rivers. In the Kenmare River area, the Coriolis effect will cause plumes from rivers that enter the bay to try to flow in a northerly direction. The three rivers that enter via Ballinskelligs Bay (Emlaghmore, Inny and Currane/Waterville) will initially travel in an anticlockwise direction and then head northwards once past Bolus Head and thereby have no interaction with the site at Deenish. Plumes of rivers on the south shore of Kenmare Bay e.g., the Cloonee, will flow northwards across the bay and deflect westwards before turning to the northwest at Lamb's Head and thereby have no interaction with the Deenish site. The rivers that enter the bay on its north shore will flow westwards before also turning to the northwest at Lamb's Head and thereby have no interaction with the Deenish site. Returning salmon will therefore not pass close to the Deenish site. Departing adult salmon and smolts are thought to follow the plumes of their nascent river and move out into deeper water off the coast as quickly as possible. For this reason, they will therefore not pass close to the Deenish site and even if they did, the likelihood of the fish interacting with larval lice is considered as being very low given the low densities of larvae in the water at distance from the fish farm.

Sea trout are considered to have relatively shorter migration patterns than salmon and are thought to stay close to the mouths of their nascent rivers, or typically inhabit the coastal environment during their marine phase (see IFI document, p.7, end of para. 3).

MI - Further comments or requests

Although marine survival can vary between years and regions, many Atlantic salmon populations in the North East Atlantic area are currently recording record low numbers of returning adult salmon to their rivers (ICES, 2021[169]). This has led to an increased research focus on the salmon post-smolt life stage and migration trajectories at sea however data on marine distribution of salmon is limited in Ireland, although a number of possible feeding and migration routes have been inferred through recaptures at sea. The trends in return rates for one sea winter salmon populations in the North East Atlantic area (of which Irish salmon rivers are a significant contributor) are declining and currently at record low levels ranging between 3-6% in recent years in comparison to 14% in the 1980's, as reported by ICES. In general, progression through rivers and estuaries is fast with timing and speed of movement into coastal waters varying only marginally between regions (Barry et al., 2020[170], Lilly et al., 2024[171]). Subsequent movements away from inshore coastal regions to the open ocean are poorly understood with limited empirical research data available. The current literature suggests that post-smolts travel in small groups and remain close to the surface where they are strongly influenced by environmental conditions such as wind and currents. There are very few empirical studies of salmon post-smolt migration in Ireland however inferences can be made from recent studies undertaken in the Irish Sea, and Clew Bay on the west coast of Ireland. Mortality levels during the outmigration period can be high, with in river mortality levels of 18% for the River Bann and 23% for the Castletown River (Barry et al., 2020). In the Burrishoole system on the west coast of Ireland, the overall percentage survival was 63% for wild smolts and 58% for hatchery smolts, in studies performed between 2017-18 (Doogan et al., 2023[172]). An additional study performed between 2020-2022 (Waters et al., 2024[173]), showed that of 217 salmon smolts tagged and released, only 175 were successfully detected on one or more estuarine receivers beyond the lake exit of Lough Furnace. In

[169] ICES. 2021. Working group on North Atlantic Salmon (WGNAS). ICES Scientific Reports 3:29. 407 pp.
[170] Barry, J. et al. 2020. Atlantic salmon smolts in the Irish Sea: first evidence of a northerly migration trajectory. Fisheries Management and Ecology 27: 517-522.
[171] Lilly, J. et al. 2024. Migration patterns and navigation cues of Atlantic salmon post-smolts migrating from 12 rivers through the coastal zones around the Irish Sea. Journal of Fish Biology 104: 265-283.
[172] Doogan, A. et al. 2023. Partitioning survival during early marine migration of wild and hatchery-reared Atlantic salmon (Salmo salar) smolts using acoustic telemetry. Animal Biotelemetry 11: 39.
[173] Waters, C. et al. 2024. The use of predator tags to explain reversal movement patterns in Atlantic salmon smolts (Salmo salar). Journal of Fish Biology (in press).

a study of Atlantic salmon post-smolts entering the Irish Sea from rivers in Northern Ireland, Scotland and England, overall minimum migration success ranged from 6% to 95% (Lilly et al., 2024). These studies proposed that the most likely source of mortality during the early phase of outmigration was predation (in addition to any possible tagging mortality). These studies also provide strong evidence that smolts progress quickly from the coast into deeper offshore waters with reported speeds, from the various studies, ranging from 7 km/d up to 40 km/d. Doogan et al. (2023) proposed that the migrating smolts follow the strongest currents out of Clew Bay through the channel north of Clare Island in order to take the most direct route out of the bay towards feeding grounds to the north. It has been suggested that salmon may be drawn to fish farms encountered on their seaward migration, where predators can also accumulate. However, Doogan et al. (2023) found that smolts showed no preference for the route closest to the fish farm receiver and there was no evidence that the presence of the fish farm significantly impacted movements to Clare Island. A collaborative study across multiple jurisdictions (Lilly et al., 2023) has shown that post-smolts from Clew Bay (and possibly by inference, any smolts from the western coast of Ireland), did not migrate through the Minch waters (between mainland Scotland and the Outer Hebrides) but most likely migrated broadly west in the waters between the Hebridean islands and the island of Ireland, thus avoiding the aquaculture zone along the west coast of Scotland.

Firm conclusions on interactions between sea lice origination from farms and interactions/impacts with salmonids requires a proper approach to obtaining the actual migration routes, dispersion and timing during feeding migrations and return spawning migrations by actively tracking salmonids from key catchments in the area. In the absence of this information the movements of salmonids in the area around the farms remain speculative. We can only therefore hypothesise that post-smolts from Kenmare Bay will migrate through the Bay quickly, not be attracted to the farm at Deenish and also not be exposed to salmon louse copepodids emanating from farms along their migration route up the West coasts of Ireland and Scotland.

3.6.1.3 Deficiencies in sea lice monitoring

Point raised

In Section 3.8 Mitigation in the Screening for Appropriate Assessment and Natura Impact Statement Volume 1 it is stated that, “Habitats Directive Annex II Species salmon maybe [sic] affected by the proposed farm through lice infestation, disease spread and the introduction of therapeutants…. the breaking of disease and parasite life cycles with the effect of enhancing the efficacy of lice control and reducing the overall incidence of disease in the stocks and the use of therapeutants, thereby reduces) risks to wild population of salmon.”

The consultation documentation sets out the envisaged sea lice monitoring and control protocols for the proposal which is based on the standard existing lice monitoring and control protocols used already in salmon farms in Ireland with some minor additional sampling proposed by the applicant. The code of practice for this pest control is not, in the view of IFI, adequately robust to ensure the protection of wild sea trout and salmon smolts from sea lice emanating from the salmon farm. The applicant is requesting a licence for a substantial increase in existing salmon farm production over the original licence and therefore, we consider that the total level of stocking and production should be the key consideration when assessing lice loads in relation to determining treatment trigger levels in the context of their consequent risks to wild salmonids rather than using an average measure of lice levels on the farmed salmon to make such determinations. The North Atlantic Salmon Conservation Organisation (NASCO) developed ‘Guidance on Best Management Practices to address impacts of sea lice on wild salmon stocks’ in 2009 (NASCO 2009). This guidance was intended to supplement previous NASCO resolutions and to assist the Parties and jurisdictions in managing

salmon aquaculture. The NASCO international goal is that 100% of farms are to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms. This is not clearly demonstrated in the consultation documentation. Ireland is a member of NASCO through its membership of the European Union and is required to demonstrate progress at achieving this international goal through setting out specific associated actions in five-year Implementation Plans, the progress and achievement of which is reported on via Annual Progress Reports.

Indeed, the guidance notes that, "Lice control management programmes" should be "appropriate to the number of fish in the management area". Further to this, the review of Ireland's Implementation Plan found that the standard existing lice monitoring and control protocols used already in salmon farms in Ireland to attempt to fulfil the NASCO goal is, "is not specific in protecting wild salmon" and "it is not clear…how this action will enable progress towards achievement of the goals for effective sea lice management" to ensure wild salmonids are protected. Indeed, we consider that to properly evaluate ongoing risks to wild salmonids, a sampling programme focused on wild salmonids in the vicinity of fish farms would be a necessary approach to comply with these NASCO obligations and focusing solely on the lice levels in farms and inadequate fallowing periods is wholly insufficient in this regard. This is supported in the review of the Implementation Plan which "recommended that such monitoring also takes place on wild salmonid populations", as also outlined in NASCO goals.

Points addressed by the applicant

Monitoring Protocol No.3 for Offshore Finfish Farms – Sea Lice Monitoring and Control by the Department of Marine and Natural Resources, is the minimum requirement for sea lice monitoring on salmon farms. In practice, MOWI Ireland monitors sea lice weekly in all pens, which is not minor additional sampling as alleged. A minimum of 20 fish per pen is sampled and all stages of sea lice present are counted. Management decisions are based on numbers of all adult females and not on the subset of egg bearing females which is the trigger for treatment in the above referenced protocol

MI - Further comments or requests

Monitoring of salmon lice infestation levels on marine salmonid farms in Ireland was first initiated on an experimental basis in 1991. Monitoring of selected sites continued in 1992 and was increased in intensity and extent in 1993. The purpose of the initial monitoring was to obtain an objective assessment of infestation levels on farms and to provide scientific information on the nature of these infestations. Since 1994, monitoring has been carried out in accordance with the recommendations of the Sea Trout Task Force and its successor body, the Sea Trout Management Advisory Group. In 2000, the monitoring programme was formally adopted as one of a number of Monitoring Protocols (Monitoring Protocol 3 – Sea Lice Monitoring & Control) and an integrated approach to sea lice control was further developed with the publication in 2008 of the Strategy for Improved Pest Control on Irish Salmon Farms.

The Irish sampling strategy was developed through a consultation process with national and international experts in the field. It has been refined and modified as a result of the recommendations of the Sea Trout Working Group, Sea Trout Task Force and the Sea Trout Management Advisory Group. The resulting programme meets the exacting scientific requirements of a national monitoring programme and the diverse concerns of sectoral interests, as expressed through various Ministerial committees and through direct representations. The current sampling strategy:

- Provides a robust and reliable objective measure of salmon lice numbers.
- Operates within a framework which is cost effective and flexible to operate over a range of active farms.

- Takes account of weather conditions, fish health and welfare considerations.

The sea lice monitoring programme was also considered as part of a legal complaint to the EU Commission (EU Pilot Case 764/09/ENV) which was closed in favour of the State with the commission stating that they were satisfied that the Irish authorities are adequately addressing issues, including the national sea lice monitoring programme.
Most of the major Atlantic salmon farming countries have a sea lice monitoring programme in place and the setting of appropriate treatment triggers is an integral component of all monitoring programmes. Although variations exist within each programme, they are all based on estimating the abundance of sea lice on each farm i.e. the number of salmon lice per fish. A comparison of trigger levels in each country shows that the trigger levels in Ireland are comparable to those used in all other monitoring programmes. In addition, Ireland is one of only two countries to have an independent monitoring programme in place.

The applicant states that they perform their own in-house salmon lice monitoring with a lower threshold for treatment, demonstrating a commitment to go beyond current licence conditions. This is reflected in the low levels of salmon lice recorded under the National Sea Lice Monitoring Programme at the site (see Section 2.3.5.2).

3.6.1.4 Sea lice management

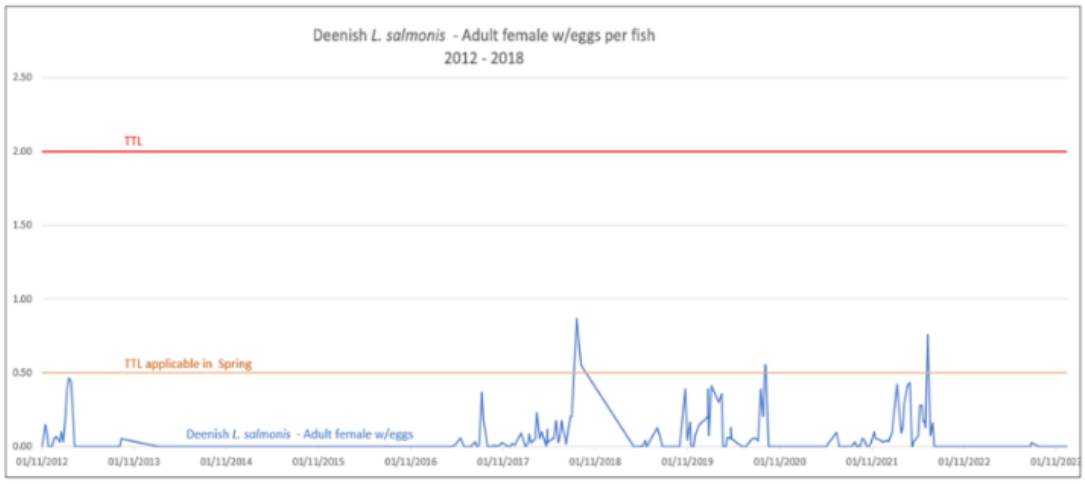
Point raised
Concerns and deficiencies in regard to proposed use of chemicals and cleaner fish for lice treatment In Section 2.1.13.2.1 Treatments in the Screening for Appropriate Assessment and Natura Impact Statement Volume 1 – Main Report (and the corresponding section in the EIA), the main focus of sea lice control treatments is the use of cleaner fish sourced from wild caught wrasse from Kenmare Bay and hatchery reared lumpfish with such cleaner fish intended to be deployed from the first June post transfer at a ratio of 7 cleaner fish per 100 salmon which are to be further supplemented with locally caught wrasse during summer months. With a stocking abundance of 619,250 salmon in the first June as stated in the proposed production cycle, this equates to in the region of 43,000 cleaner fish at the proposed ratio of 7 cleaner fish per 100 salmon. However, elsewhere in the consultation documentation, it is stated that, “This will involve the stocking of hatchery-reared wrasse and lumpsucker at a rate of 6% of the salmon pen population”, which equates to 619,250 @ 6% = 37,155 cleaner fish. The EIA states that, “It is MOWI’s objective to have 100% supply of hatchery-reared cleaner fish available to all sites by 2021”. It is unclear whether this has been achieved by MOWI and is at odds with the intentions stated for the proposed operations to also use locally-caught wild wrasse for sea lice control. Data from 2017 report that 25,361 wrasse were introduced as cleaner fish at the Deenish island site for sea lice control purposes; and at its sister salmon farm, Inishfinnard, between 2016 and 2018, 48,619 wrasse were introduced. The potential consequences of using wrasse harvested from the wild as cleaner fish in salmon aquaculture is highlighted in the draft National Strategic Plan for Sustainable Aquaculture Development 2030 and its associated SEA Environmental report and Natura Impact Statements an ongoing concern. IFI have serious concerns regarding the impact to marine ecosystems from the stated intention of removing large numbers of locally-caught wild wrasse for extensive use as cleaner fish for the Deenish operation including in regard to any potential knock-on impacts to biodiversity, qualifying features, and indeed recreational fisheries. No such assessment on this matter appears to be made in either the NIS or EIA and no scientific stock assessment on the current status of the wild wrasse population to ascertain whether the rates of intended harvest would be sustainable was presented

Further to the above, in Table 2.7 of both the NIS and EIA, it is noted that SLICE has been used in either two or three years at the site in the period 2010-2018. However, this cannot be established as there is an apparent error in the years in the final row of the table. Indeed, it is unclear whether SLICE has been used more recently to this at Deenish Island operation and no more up to date information was presented in relation to this in the consultation documentation

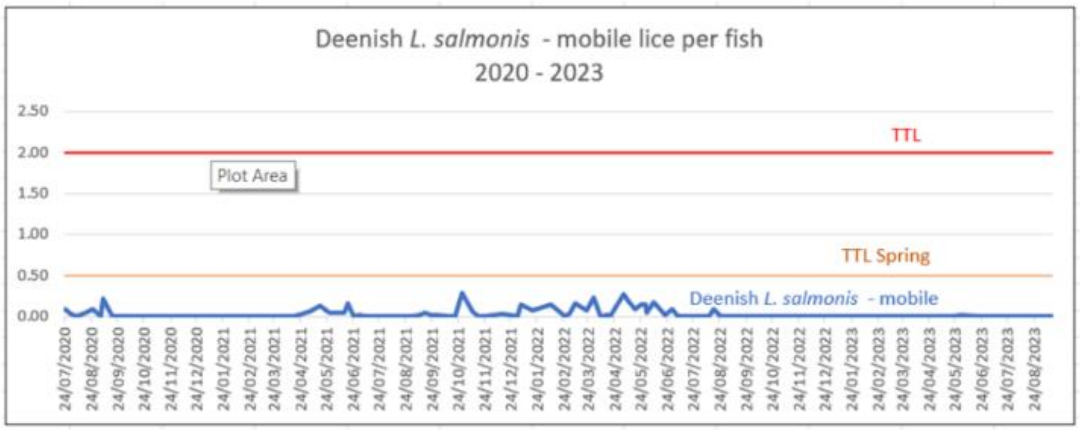
Points addressed by the applicant

MOWI Ireland has developed a non-medicinal strategy to control sea lice using cleaner fish. This is the preferred strategy for managing sea lice infestations. Results to date illustrate that cleaner fish will maintain ovigerous lice levels on salmon in pens at or below 0.1 lice per fish. It also has the beneficial effect of radically reducing the use of chemical treatments and, therefore, treatment dispersal. MOWI Ireland sources hatchery reared lumpfish from two hatcheries in Ireland and Wales in addition to hatchery reared wrasse supplemented with locally caught wrasse.

The National Survey of Sea Lice (*Lepeophtheirus salmonis* Krøyer and *Caligus elongatus* Nordmann) on Fish Farms in Ireland 2010 to 2022 shows that in the Southwest (all farms) there were no recorded instances *of L. salmonis* infestation levels greater than the treatment trigger level (see figures below).



Adult ovigerous female L. salmonis reported at Deenish 2012-2023 (blue). TTL Spring (orange) is the treatment trigger level set by the Marine Institute for the Spring period and TTL (red) is the treatment trigger level set for all other times. Note that at no time were the TTL levels breached and for most of this period the levels were significantly lower than the trigger levels.



All mobile L. salmonis reported at Deenish 2020-2023 (blue). TTL Spring (orange) is the treatment trigger level set by the Marine Institute for the Spring period and TTL (red) is the treatment trigger level set for all other times. Note that in the sea lice monitoring protocol TTL thresholds apply to adult ovigerous female L. salmonis, but at no time were the TTL levels breached even for all mobile sea lice and for most of this period the levels were significantly lower than the trigger levels.

With reference to the use of treatments to control sea lice, the use of therapeutics for the control of parasites and infections is strictly controlled by Organic standards. Only treatments approved by the Irish Health Products Regulatory Authority (HPRA) and organic regulations are permitted for use in organic farms. Treatments, if required, are always under veterinary supervision and must comply with veterinary written directions, and notification is made to the organic certification bodies as well as observing mandatory withdrawal periods.

Regarding the use of SLICE (Emamectin benzoate) this is applied in the first few months post transfer to sea with only one treatment in a full production cycle. Thus since 2017, there have been three treatments with SLICE, one in June 2019, June 2021 and June 2023

MI - Further comments or requests

This issue is covered across various Sections above.

3.6.1.5 Impact of sea lice on wild salmonids.

Point raised

IFI have specific concerns in relation to the lack of sufficient consideration given in the EIA and NIS to the issue of potential impacts of sea lice associated with salmon farming on wild Atlantic salmon and sea trout stocks and consider that this is not at all adequately assessed in either document. The consultation documentation states that, "Evidence suggests that sea lice induced mortality has an impact on Atlantic salmon returns, which may impact the achievement of conservation limits in salmon rivers" and concludes that, "Consequently it can be concluded that the proposed operations at the site are unlikely to result in significant impact in sea lice infestations in wild salmon populations; consequently there will be no likely significant direct effects to the Qualifying Feature salmon and no likely significant indirect effects to the Qualifying Feature freshwater pearl mussel" principally as a result of the proposed mitigation measures to control sea lice on the farm. IFI consider that the consultation documentation provides a very limited, unbalanced and wholly inadequate synopsis and evaluation of the extensive relevant peer-reviewed and published scientific literature available, the vast majority of which support that sea lice emanating from fish farms have the potential to be detrimental to wild salmonids stocks. Due to the potential consequences for the sustainability of wild salmonid stocks in the region around the proposed operation, many of which are in a vulnerable state, it is recommended that comprehensive evaluation of the extensive evidence already available should have been undertaken.

The consultation documentation primarily relies on selected extracts from the eight-year-old ICES (2016) WKCULEF report to support the conclusions made. There is a paucity of critical or objective appraisal apparent in the context of the wider literature now available in order to make a comprehensive, more balanced and objective assessment of the potential effects on wild salmon stocks from increased sea lice loads that may arise as a consequence of the proposed farm operation. Indeed, the ICES (2016) WKCULEF report also states that it is, "also true that a small incremental increase in marine mortality due to sea lice (or any other factor) can result in losses of salmon abundance that are relevant for fisheries and conservation management". Furthermore, the consultation documentation relies heavily on Jackson et al. 2013 through its citations in the ICES (2016) WKCULEF report as its principal source to provide doubt as to the impacts of sea lice associated with salmon farming on wild salmon stocks. Indeed, Krkošek et al. (2014) [*Comment on Jackson et al. 'Impact of Lepeophtheirus salmonis infestations on migrating Atlantic salmon, Salmo salar L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality' Journal of Fish Diseases*] noted that there are methodological errors in the Jackson et al. (2013) paper which contented that sea lice play a minor, perhaps even negligible, role in salmon survival. Krkošek et al. (2014) states, "Our foregoing reanalyses depart substantially from those reported and interpreted by Jackson et al. (2013), and in their previous publications that utilized the same data (Jackson et al. 2011a,b). Whereas they assert that sea lice cause 1% of mortality in Atlantic salmon, the correct estimate is actually a

one-third loss of overall adult recruitment. To further illustrate, if, in the absence of parasites, final adult recruitment is 6% of smolt production, then the effect of parasite mortality reduces that recruitment to 4%. According to interpretations used by Jackson et al. (2013), that is a change of 2%, which we agree is a small number. However, the realized effect is that it reduces the abundance of adult spawners returning to a river from, say, 6000 down to 4000; this one-third loss of salmon returns could have significant conservation or fishery implications". Indeed, Jackson et al. (2013) in their own paper did find that sea lice-induced mortality on outwardly migrating smolts can be significant, and found an odds ratio of 1.14:1, which equates to a 12.3% decrease in returning adult salmon due to sea lice infestation from local salmon farms.

In the Irish context, a number of key studies on the impact of sea lice from marine salmon farms on wild salmon have been published. In a study in the Erriff river, Gargan et al. (2012) demonstrated that hatchery salmon smolts treated against sea lice infection were 1.8 times more likely to return than control fish, with a 44.4% mortality of untreated salmon. The results suggested that sea lice induced mortality can significantly negatively impact adult salmon returns and that sea lice larvae emanating from salmon farms may influence individual survivorship and population conservation status of wild salmon in Irish rivers. Shephard and Gargan (2017) used a 26-year record from the Erriff River to evaluate the contribution of sea lice from salmon aquaculture to declining returns of wild one-sea-winter (1SW) salmon. Statistical models suggested that wild salmon returns were >50% lower in years following high lice levels on nearby salmon farms during the smolt out-migration. Shephard and Gargan (2020) showed that wild Atlantic salmon exposed to sea lice from aquaculture in Ireland had a reduced marine survival and modified response to ocean climate. Annual counts of 1SW fish were studied from ten rivers in Ireland, including five "control" systems without salmon aquaculture. Rivers with aquaculture showed lesser returns (mean 33%, range 19–46%) in years following high lice levels on nearby salmon farms. These published studies in Ireland contradict the conclusions in the NIS and EIA that farm origin lice are very unlikely to impact on wild salmon smolts migrating through areas of salmon aquaculture and further highlight the wholly inadequate assessment made in the consultation documentation to reach the conclusions made that significant impacts are unlikely.

A synopsis of some of the relevant published peer-reviewed literature to support the potential for impacts of increased sea lice loads associated with salmon farming on migratory salmonid stocks is provided below. Although not a qualifying species under the Habitats Directive, the additionally presented studies focusing on sea trout are also relevant to provide an indication of the likely potential effects to wild salmon due to their similar biology and life histories as salmon, and indeed sea trout may be particularly susceptible to such effects as they typically inhabit the coastal environment during their marine phase.

- Shephard, S. and Gargan, P. (2021). System-specific salmon louse infestation thresholds for salmon farms to minimize impacts on wild sea trout populations. Aquacultural Environment Interactions, 13: 377-388.
  - Main finding: Salmon farm louse production in spring can have a strong system-specific regulating effect on wild sea trout populations. Regulations relying on a generic louse threshold to trigger treatment are not sufficient to protect sea trout populations — stocking density and site characteristics must be considered to evaluate system-specific infestation pressure and impacts on wild salmonids.
- Shephard, S. and Gargan, P. (2020). Wild Atlantic salmon exposed to sea lice from aquaculture show reduced marine survival and modified response to ocean climate. ICES Journal of Marine Science, 78: 368–376.
  - Main finding: Examined annual counts of on-sea-winter salmon from ten rivers in Ireland, including five "control" systems without salmon aquaculture. Most counts showed a downward trend, consistent with declines in Atlantic salmon populations. Rivers with aquaculture showed lesser returns (mean 33%, range 19–46%) in years following high lice levels on nearby salmon farms.

- Gargan, P.G., Shephard, S. and MacIntyre, C. (2017). Assessment of the increased mortality risk and population regulating effect of sea lice (Lepeophtheirus salmonis) from marine salmon farms on wild sea trout in Ireland and Scotland. In: (Harris, G, ed.) Sea Trout: Science & Management. Proceedings of the 2nd International Sea Trout Symposium, pp. 507–522.
  - Main finding: Undertook an assessment of the increased mortality risk and population regulating effect of sea lice from marine salmon farms on wild sea trout in Ireland and Scotland in relation to the mortality risk thresholds used to assess potential impacts on wild salmonids of salmon aquaculture in Norway. Analysis of this large international sea trout dataset from Ireland and Scotland revealed levels of lice infestation on sea trout that imply increased mortality risk in the early years of monitoring in both countries. Lice loads on sea trout have reduced in recent years, likely reflecting improved lice control and changes in salmon farming practice. Results reveal that the likely sea trout population regulating effect of sea lice varied among locations; with many sites recording lice levels likely to result in strong population regulating effects over a prolonged period, particularly in the west of Ireland.
- Shephard, S. and Gargan, P.G. (2017). Quantifying the contribution of sea lice from aquaculture to declining annual returns in a wild Atlantic salmon population. Aquacultural Environment Interactions, 9: 181–192.
  - Main finding: A 26-year study from the Erriff River to evaluate the contribution of sea lice from salmon aquaculture to declining returns of wild one-sea-winter salmon. Statistical models suggested that returns were >50% lower in years following high lice levels on nearby salmon farms during the smolt out-migration.
- Gargan, P.G., Kelly, F.L., Shephard, S., and Whelan, K.F. (2016). Temporal variation in sea trout (Salmo trutta L.) life history traits in the Erriff river, Western Ireland. Aquacultural Environment Interactions, 8: 675–689.
  - Main findings: analysed a 20 year time series (1985−2004) using 15 sea trout population response variables. Over this period, important life history changes were observed. The most dramatic of these changes corresponded with the period immediately after the commencement of salmon farming in the local estuary, with significant decreases in the number and length of sea trout kelts, the estimated number of eggs deposited, the sea trout rod catch, the proportion of older (1+ and 2+ sea age) fish and the frequency of repeat spawners. A significant positive relationship was found between the number of salmon lice in the local salmon farm and the number of lice found on sea trout collected contemporaneously in local rivers.
- Shephard, S., MacIntyre, C., and Gargan, P.G. (2016). Aquaculture and environmental drivers of salmon lice Lepeophtheirus salmonis infestation and body condition in sea trout (Salmo trutta L.). Aquacultural Environment Interactions, 8: 597–610.
  - Main findings: 25 year dataset was collated comprising lice counts from > 20 000 sea trout sampled from 94 separate river and lake systems in Ireland and Scotland at varying distances from marine salmon farms. Sea trout captured closer to salmon farms had significantly higher levels of lice infestation, and that this effect was exacerbated in warmer years. Sea trout sampled closer to salmon farms also had significantly reduced weight at length (impaired condition), with the strongest impact in dry years.
- Gargan, P.G., Forde, G., Hazon, N., Russell, D.J.F. and Todd, C.D. (2012). Evidence for sea lice-induced marine mortality of Atlantic salmon (Salmo salar L.) in western Ireland from experimental releases of ranched smolts treated with emamectin benzoate. Canadian Journal of Fisheries and Aquatic Sciences, 69: 343–353.
  - Main findings: Hatchery salmon smolts treated against sea lice infection were 1.8 times more likely to return than control fish, with a 44.4% mortality of untreated salmon. The results suggested that sea lice induced mortality can significantly negatively impact adult salmon returns and that sea lice larvae emanating from salmon farms may influence individual survivorship and population conservation status of wild salmon in Irishrivers.

- Krkošek, M., Revie, C.W., Gargan, P.G., Skilbrei, O.T., Finstad, B. and Todd, C.D. (2013). Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean. Proceedings of the Royal Society B, 280: 20122359.
  - Main findings: A meta-analysis concerning the influence of parasitism by crustaceans on the marine survival of Atlantic salmon. The data include 24 trials in which tagged smolts (totalling 283 347 fish; 1996–2008) were released as paired control and parasiticide-treated groups into 10 areas of Ireland and Norway. All experimental fish were infection-free when released into freshwater, and a proportion of each group was recovered as adult recruits returning to coastal waters 1 or more years later. Treatment had a significant positive effect on survival to recruitment, with an overall effect size (odds ratio) of 1.29 that corresponds to an estimated loss of 39 per cent of adult salmon recruitment.
- Gargan, P.G., Tully, O. and Poole, R. (2003). The Relationship Between Sea Lice Infestation, Sea Lice Production and Sea Trout Survival in Ireland, 1992-2001. In: Salmon on the Edge (ed. D. Mills), pp. 119–135. Blackwell Science, Oxford, UK.
  - Main findings: Found a statistically significant relationship between lice infestation on sea trout and distance to the nearest salmon farm in Ireland over a 10 year period, with highest infestations and variation in infestation seen close to fish farms and showed that sea lice associated with salmon farming can affect sea trout stocks up to 30km from the farms. It showed a significant negative relationship between sea trout survival and the level of lice infestation. The results indicated that sea lice from marine salmon farms were a major contributory factor in the sea trout stock collapse observed in aquaculture areas in the west of Ireland.
- Tully, O. Gargan, P.G., Poole, W.R., and Whelan, K.F. (1999). Spatial and temporal variation in the infestation of sea trout (Salmo trutta L.) by the caligid copepod Lepeophtheirus salmonis (Kroyer) in relation to sources of infestation in Ireland. Parasitology 119: 41−51.
  - Main findings: demonstrated that the presence of salmon farms significantly increased the level of sea lice infestation on sea trout post smolts in Ireland.
- Thorstad, E.B., Todd, C.D, Uglem, I., Bjørn, P.A, Gargan, P.G, Vollset, K.W., Halttunen, E., Kålås, S., Berg, M. and Finstad, B. (2015). Effects of salmon lice Lepeophtheirus salmonis on wild sea trout Salmo trutta—a literature review. Aquacultural Environment Interactions, 7: 91–113.
  - Main findings: An international review of over 300 papers. In an extensive review of the impacts of the salmon louse on sea trout, it was concluded that salmon farming increases the abundance of salmon lice in the marine habitat, and there is extensive published evidence that salmon lice in intensively farmed areas have negatively impacted wild sea trout populations by increasing marine mortality, changes in migratory behaviour, reduction of marine growth and reduced population sizes. This review paper also reviews literature on the impacts to wild salmon and finds that mortality attributable to salmon lice can lead to an average of 12−29% fewer salmon spawners.

The studies reviewed demonstrate that salmon farming increases the abundance of salmon lice in the marine habitat and there is extensive published evidence that salmon lice in intensively farmed areas have negatively impacted wild sea trout populations. The effects of salmon lice on sea trout include increased marine mortality, changes in migratory behaviour, reduction of marine growth of individual fish, and reduced population sizes.

These conclusions are based on:

(1) Studies of salmon lice impacts on individual sea trout in laboratory and field studies documenting host tissue damage, osmoregulatory dysfunction and other physiological stress responses, reduced growth, and increased susceptibility to secondary microbial infections and reduced disease resistance.

(2) Documentation of premature return to fresh- water of sea trout carrying high levels of salmon lice. Premature return may facilitate individual survival and recovery from infestation in the short term,

but does compromise growth potential, and thereby future fecundity, as well as impairing the immune defence system;

(3) Catch statistics and routine population monitoring utilizing in-river traps that have indicated changes in population abundance, age structure and altered life history characteristics in association with the onset and development of salmon farming in the adjacent environment;

(4) Monitoring of salmon lice levels on wild fish in relation to spatiotemporal variation in salmon farming intensity and biomass production;

(5) Indications of population-level effects on sea trout derived from monitoring of salmon lice levels on wild fish in relation to experimentally determined threshold levels known to induce physiological compromise and mortality of individual fish.

- Thorstad. E.B. and Finstad, B. (2017). Impacts of salmon lice emanating from salmon farms on wild Atlantic salmon and sea trout. Norwegian Institute for Nature Research (NINA), 13 pp. https://wildfish.org/wpcontent/uploads/2022/06/Thorstad-Finstad-2017-Summary-of-impacts-of-salmon-lice.pdf
  - Summary: "Results from scientific studies on the impacts of salmon lice on Atlantic salmon and sea trout are summarized here. Considerable evidence exists that that there is a link between farm-intensive areas and the spread of salmon lice to wild Atlantic salmon and sea trout. Several studies have shown that the effects of salmon lice from fish farms on wild salmon and sea trout populations can be severe, ultimately reducing the number of adult fish due to salmon lice induced mortality, resulting in reduced stocks and reduced opportunities for fisheries. Depending on the population size, elevated salmon lice levels can also result in too few spawners to reach conservation limit."

In addition to the above, the prevalence of another fish louse *Caligus elongatus* in this area and its impact on wild and farmed salmon and wild sea trout is another risk factor for wild salmonids. Research activity on *C.elongatus* , in relation to its impact on wild salmonids in marine waters, which is challenging to investigate due to the parasite's life history and mobility, is increasing. Nonetheless, the precautionary principle should apply given the risks posed by the presence of a likely *C. elongatus* reservoir in the form of a large marine finfish installation.

As stated previously, IFI consider the EIA and NIS provide a very limited, unbalanced and wholly inadequate synopsis and evaluation of the extensive relevant peer-reviewed and published scientific literature available, some of which is presented above.

In the Screening for Appropriate Assessment and Natura Impact Statement Volume 1, it is stated that its purpose, "is to provide the competent authority (DAFM) the necessary information required to conduct the AA and determine in view of best scientific knowledge, and in the view of the Conservation Objectives of the site, whether the proposed project, either individually or in combination with other plans and projects is likely to have a significant effect on a Natura 2000 site and, where necessary, to ascertain whether any such effect would adversely affect the integrity of Natura 2000 sites." In addition, EC (2021). Commission notice. Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC advises that, "The assessment must be based on the best available scientific knowledge in the field. This means that the information must be complete and up-to-date." Furthermore, the European Union's Environmental Impact Assessment Directive aims to ensure that projects that are likely to have a significant impact on the environment are identified and assessed, within an appraisal process, before these projects proceed to development. Under Article 3 the 2011 Directive an EIA process must identify, describe and assess likely effects (positive and negative) of a proposed development on among other elements, fauna and flora which includes wild salmonids. It is considered that the wholly inadequate assessment of the impact of sea lice from salmon farms on wild salmonids made in this NIS and EIA as outlined above fails to meet the stated objectives of the NIS (and indeed fulfil the official scope provided in standard guidance documents for the preparation of NISs) and the requirements of the EU Environmental Impact Assessment Directive.

Points addressed by the applicant

In paragraph 1 of the IFI submission document, it is noted that there is no reference to a large volume of peer reviewed scientific publications that "clearly" demonstrate that salmon farm origin sea lice can play an important role in causing large increases in marine mortality of salmon and sea trout stocks. The IFI document fails to reference literature that demonstrates the opposite e.g., Costelloe et al. 1995, 1996a, 1996b, 1988a and 1998b.

The IFI documents states (p.6 para.1) that "the consultation documentation provides very limited, unbalanced and wholly inadequate of the relevant peer reviewed and public scientific literature available, the vast majority of which support that sea lice emanating from fish farms have the potential to be detrimental to wild salmonid stocks" and on pages 7 - 10, provides a list and a summary of the findings of each of 12 publications.

As previously pointed out, the IFI document chooses to ignore publications that present larval sea lice density data at distance from the farm and biasedly only quote papers that suits its opinion.

On p.10, para. 3, the IFI document refers to another louse, Caligus elongatus. However, the IFI document fails to note is that the behaviour of Caligus is extremely different to that of Lepeophtheirus salmonis. This is because L. salmonis is a specialist salmonid ectoparasite andhas only been recorded on 4 non-salmonid taxa while C. elongatus has been recorded on ca 80 taxa including elasmobranchs and teleosts (Kabata, 1979; Revie et al., 2002). Lepeophtheirus adults stay attached to salmon for most of their lives whereas Caligus adults arrive on farms in swarms and then depart after a short period of time. Their impact therefore on host fish is of a far lower impact than L. salmonis.

The submission by Inland Fisheries Ireland largely relates to the topic of sea lice levels on farmed salmon and the transmission of sea lice on farmed salmon to wild salmon and sea trout, particularly sea trout. This topic of discussion is now more than three decades old and first arose in Ireland after the well documented collapse of sea trout populations in river systems throughout the west of Ireland. It should be noted that prior to the sea trout collapse in the west of Ireland there were no measurements of sea lice levels on farmed salmon. These measurements commenced in 1991 and many observers subsequently retrospectively associated the sea trout collapse with lice levels on farmed salmon. Editors of peer reviewed articles allowed this retrospection to flourish. A number of peer reviewed articles proved controversial, and this controversy was largely associated with the interpretation of the results of return rates of reared salmon control groups and groups treated with therapeutants against infestation with sea lice. Basically, opposed viewpoints argued for and against the interpretation of the results with one argument relating the differences in survival to the numbers of smolt released and the other relating differences in survival to the numbers of adult fish returning. What is clear is that for both arguments and release groups, more than 95% of test / control fish suffered mortality and there was a general failure to look at this bigger picture.

When it comes to the bigger picture with respect to salmon aquaculture, Ireland is rarely referenced in the same terms as Scotland and Norway. The bulk of the scientific literature relating to impacts of salmon aquaculture on wild salmonids emanates from these countries.

Accordingly, relevant issues are addressed in a supplement to this document (Appendix 1) (*available as PDF with application documents*).

With regard to Atlantic salmon most rivers throughout the British Isles have witnessed a decline in smolt to 1SW adult return from in the region of 20% during the 1980s to 5% and similar rates of decline (albeit with lower percentages) have been witnessed for MSW fish.

Should we expect that sea trout return rates would differ from the above? The fish counter information for Waterville indicates that the number of sea trout entering the Cummeragh River system during the mid-1990s was in the region of 30,000 fish. That number, for the years 2015-2022 is less than 5000. Other river systems in Ireland e.g. the River Erriff in Co. Mayo has shown high variation in annual sea trout counts during the years 1986-2022 while another river system in Co.

Mayo, the Burrishoole, has more or less lost its sea trout population with the numbers of sea trout smolt counted downstream and sea run counted upstream each year more or less flatlined.

It would be useful to have a concerted effort undertaken to assess the reduced survival of salmon and sea trout in river systems throughout Ireland and to tease out whatever differences may be apparent between river systems.

Ireland currently has technical expert groups for European eel and Atlantic salmon. The Technical Expert Group on Eel (TEGE) has been in existence since 2010 and was formerly known as the Standing Scientific Committee on Eel and since 2017 as the Technical Expert Group on Eels which reports on eel matters to the north-south standing scientific committee on inland fisheries (NSSSCIF). The Technical Expert Group on Salmon (TEGOS) also reports to the NorthSouth Standing Scientific Committee for Inland Fisheries (NSSSCIF) and has been in existence for many years.

A Sea Trout Working Group (1993-1995) reported to the Minister for the Marine, Marine Institute, Fisheries Research Centre, Abbotstown, Co. Dublin during these years. However, there has not been a 'technical expert group' deliberating on sea trout matters in Ireland since those years. Inland Fisheries Ireland participates in both the TEGE and TEGOS.

Inland Fisheries Ireland initiated Currane STAMP in 2019 (as reported in The Irish Times (23 Dec 2019) as follows:

• An assessment and monitoring project entitled Currane Stamp has commenced in the Lough Currane catchment in Waterville, Co Kerry to identify factors contributing to the decline of sea trout populations.

• Research staff will use traditional techniques to examine aspects of sea trout ecology while habitat surveys will map important spawning and nursery areas. Electrofishing will also be conducted to assess juvenile fish population trends against previous studies.

• Tracking the movement of juveniles tagged with acoustic tags is already under way in Ballinskelligs Bay and the Currane system with a view to uncovering their freshwater movement and inshore migratory routes.

• The research will be co-ordinated and conducted from Met Éireann's Valentia Observatory in Cahersiveen where Inland Fisheries Ireland (IFI) research officer Ryan Murray will be based and supported by local fisheries staff.

• In addition to sea trout assessment, the team will work on a salmon-monitoring plan to determine if population trends between the two species are related.At the time of writing, no information relating to IFI's Currane STAMP is available on **www.fisheriesireland.ie**

Lough Currane sea trout

There is a long history of sea trout investigations on Lough Currane and all of those investigations are referenced in Fahy and Rudd (1988). Fahy (1980) reported on an analysis of rod caught sea trout on Lough Currane during the years 1973-1974.

Subsequently, Fahy and Rudd (1988) examined a total of 1191 sea trout taken on rod and line during the months of July and August in the years 1980-1986, inclusive.

The following is a summary of their findings:

Table 1 Summary of sea age groups recorded among rod caught sea trout on Lough Currane during the years 1980-1986

Year	Number	%0SW	%1SW	%PS
1980	214	33.6	50	16.4
1981	340	82.1	10.2	7.7
1982	108	59.2	24.8	16
1983	86	93.9	2.3	3.8
1984	88	70.9	17.5	11.6
1985	183	78.7	12.1	9.2
1986	172	64.3	24.6	11.1
Mean		69.0	20.2	10.8
SE		7.33	5.8	1.7
95% C.I.		17.9	14.2	4.1

The main finding was that 0SW or finnock predominated in rod catches made during the months of July and August during these years.

Cummeragh River system specimen sea trout

The Irish Specimen Fish Committee (www.specimenfish.ie) has maintained a record of a wide variety of freshwater and marine species of angling interest and sea trout is one of the species included. An examination of the record for specimen sea trout (weighing 6lb / 2.721kg or higher) shows that since 1973 a total of 588 specimen sea trout has been certified for Lough Currane / Cummeragh River / Waterville and other lakes in the Cummeragh River system (Derriana / Namona / Cloonaghlin / Cappal) as detailed in Figure 1. No specimen sea trout taken on rod and line on the Cummeragh River system have been certified by the ISFC since 2017.

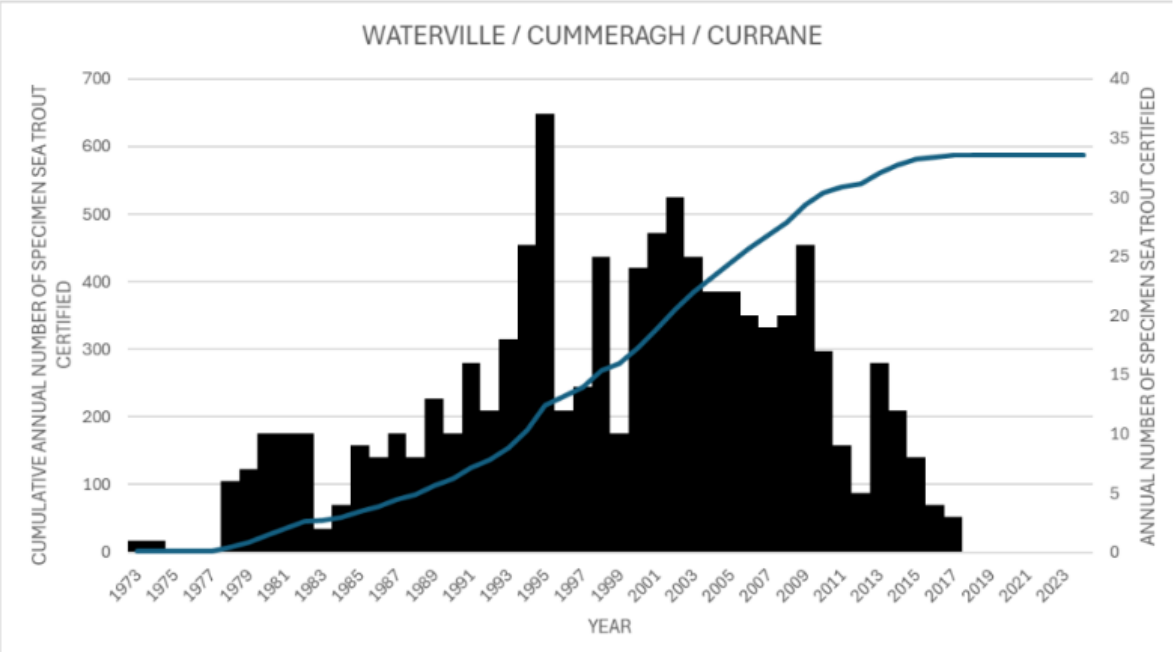


Figure 1 Number and cumulative annual number of specimen sea trout certified by the Irish Specimen Fish Committee for the years 1973-2017.

It was believed at the time that the 1989-1990 sea trout collapse in the west of Ireland extended to the south-west of Ireland also. On page 20 of Anon. (1995) it is stated: 'In 1993, conflicting sets of rod catch information were examined and it was reported (Anon 1993) that the stock (in Lough Currane and the Waterville Fishery) had probably suffered a serious decline. Later in the season a bye-law was introduced which enforced anglers to return all sea trout taken on rod and line back to the water alive. In order to establish the status of the Waterville sea trout population in 1994, an automatic video counting system was installed in Waterville to estimate the total run of sea trout. The counter

indicated a minimum population size of 29,000 fish in the Currane system in 1994 comprising all the major sea age classes. It was concluded (Anon 1994) that in light of this evidence the Waterville sea trout stock had not suffered a serious decline.

The total count corrected for downstream fish in 1995 was 32,520 compared to 29,000 in 1994.The rod catch in Waterville in 1995 was estimated to be 5410 sea trout or approximately 18% of the total stock counted entering the system.

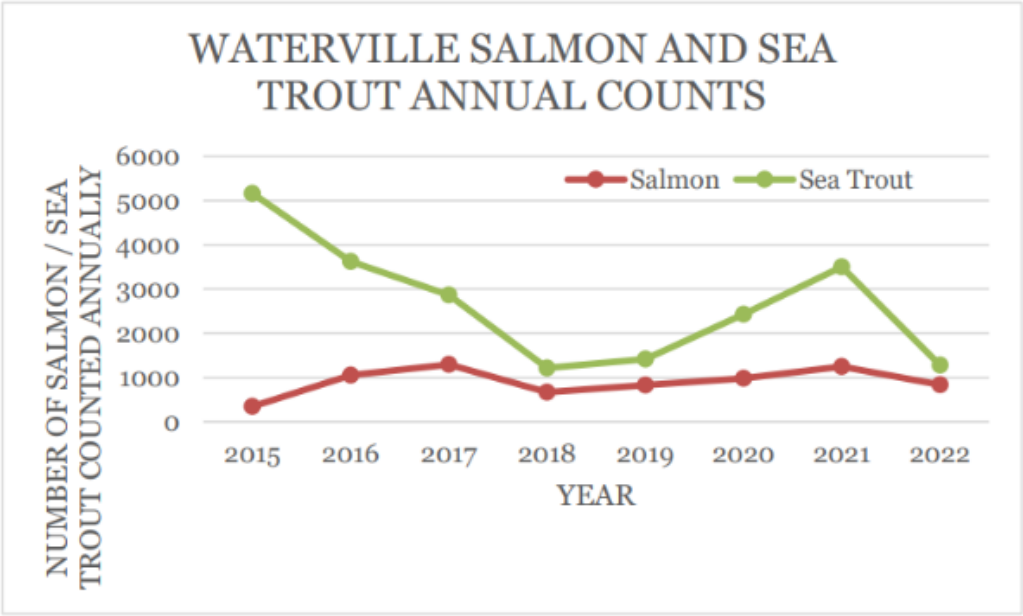
Cummeragh River system salmon and sea trout census and assessment

Moving forward three decades, Inland Fisheries Ireland now manages the resistivity fish counter at Waterville as part of the National Fish Counter Programme and has also carried out catchment wide electrofishing surveys (CWEF) on the Cummeragh River system and the neighbouring Inny River system. Catchment wide electrofishing surveys involve the deployment of battery powered electric fishing equipment at numerous stream sites throughout a catchment for 5 min periods per site and assessing the average number of 0+ salmon recorded at each site. In the absence of fish counter information on adult salmon numbers, if the average number of 0+ salmon recorded per five minutes exceeds 17 the system is deemed to be above its Conservation Limit for salmon.

Data for the Waterville fish counter have been obtained from various annual reports e.g. Anon. (2021). In these reports the categories of salmonid are as follows:

- Spring salmon
- Summer 1SW fish
- Late running salmon
- Sea trout

For the purposes of this document all salmon categories have been combined and thus there are two categories shown in the figure below, namely, salmon and sea trout.



Annual salmon and sea trout counts at Waterville (2015-2022).

The above data is included in the table below.

Annual counts of salmon and sea trout at Waterville (2015-2022)

Year	Salmon	Sea Trout
2015	345	5161
2016	1051	3624
2017	1293	2862
2018	669	1216
2019	829	1414
2020	982	2426
2021	1247	3500
2022	837	1280
Mean	907	2685
SE	109.7	491.3
95% CI	259.5	1161.9

The above counts for salmon (combining MSW early running spring salmon) and 1SW salmon (grilse) have been estimated to be above the Conservation Limit for salmon in the Cummeragh River system (Anon. 2023).

The TEGOS report for 2023 (Anon. 2023) described the salmon Conservation Limit for salmon in the Cummeragh River system as follows

- 75% predicted return 524 1SW and 165 MSW salmon
- Conservation Limit (median) 119 1SW and 83 MSW salmon
- Catch option at 75% probability of attaining the CL 237 1SW and 83 MSW salmon
- Proportion of Confidence Limit Attained 3.00 for 1SW and 1.98 for MSW

The TEGOS report for 2023 (Anon. 2023) also detailed CWEF survey results for the Cummeragh River system and the neighbouring Inny River system as follows:

• Cummeragh River system: average number of 0+ salmon per five-minute survey in:

- 2014 – 24.51

• Inny River system – average number of 0+ salmon per five-minute survey in:

- 2007 – 24.63
- 2009 – 19.78
- 2018 – 17.67
- 2022 – 22.67
- (Average for these four years – 21.19)

Thus, the CWEF surveys for both catchments indicated that salmon were above the estimated Conservation Limit in both river systems

Angling regulations for Atlantic salmon and sea trout

According to the 2024 salmon and sea trout angling regulations there are basically three types of river system:

• Those which are open to angler harvest.

• Those which are open for catch and release angling.

• Those which are closed to angling for salmon and sea trout over 40cm long.

For the bearers of valid annual salmon angling licences there is a national angling bag limit of 10 salmon (any size) or sea trout (over 40cm) per person on rivers where you may catch and retain salmon.

Subject to the above, there is a daily bag limit as follows:

• 1st January to 11th May - A total of one salmon (any size) or sea trout (over 40cm) per day (three fish in total may be retained for this period).

• 12th May to 31st August - Three salmon (any size) or sea trout (over 40cm) per day

• 1st September to the close of the season: One salmon (any size) or sea trout (over 40cm) per day.

There is a daily bag limit of three sea trout (under 40cm) per angler per day.

It is an offence to kill any sea trout in the following waters:

• Galway, Connemara or Ballinakill Fisheries Districts including at sea from Hags Head in County Clare to Clew Bay (and in any waters flowing into Clew Bay) in the Bangor Fishery District south of a line drawn due east and west through Achill Head (this byelaw has been in place since the early 1990s)

• Kerry District, in that part of the sea east of a line between Bolus Head and Lambs Head and all the waters discharging into it (i.e. Waterville area).

After the daily bag limit has been taken, anglers are permitted to fish catch and release, using single or double barbless hooks and anglers may not use worms. This also applies to anglers who have utilized their allocation of blue tags (or brown tags where they apply – Brown tags applied in the Cummeragh River system in 2023) or who are not in possession of an unused blue or brown tag for the river concerned.

Also, the killing and possession of foul hooked fish is prohibited.

On rivers where catch and release is permitted anglers may not use worms and anglers must use single or double barbless hooks. On all other rivers angling for salmon (any size) and sea trout (over 40cm) is prohibited. It is not clear exactly how angling for sea trout less than 40cm long is permitted / controlled.

There are seventeen fishery districts in the Republic of Ireland, one of which is the Kerry Fisheries District. With regard to the salmon and sea trout angling regulations for 2024 a total of 43 river systems (or parts thereof for all or part of the angling season) are open for harvest, another 43 river systems (or parts thereof for all or part of the angling season) are open for catch and release and a total of 68 river systems (or parts thereof for all or part of the angling season) are closed to angling with the exception of angling for sea trout less than 40cm long

In the Kerry Fisheries District, a total of 10 river systems (or parts thereof for all or part of the angling season), including the Cummeragh River system, are open for harvest; a total of five river systems (or parts thereof for all or part of the angling season), including the Inny River system, are open for catch and release angling while a total of 12 river systems (or parts thereof for all or part of the angling season) are closed to angling, with the exception of angling for sea trout less than 40cm long.

The regulations surrounding salmon and sea trout angling in the Republic of Ireland have become increasingly complex and enforcement of these regulations through court proceedings / fixed charge notices has also become the norm. On the Richter scale of illegal fishing who could have envisaged that a Cork angler would be prosecuted in 2023 for using barbed fishing hooks where barbless hooks were required!

With regard to all of the above, when it comes to sea trout, the basic philosophy on the part of Inland Fisheries Ireland and their parent government department appears to be to introduce a bye-law preventing the retention of sea trout on a particular river system or throughout one or more fisheries districts.

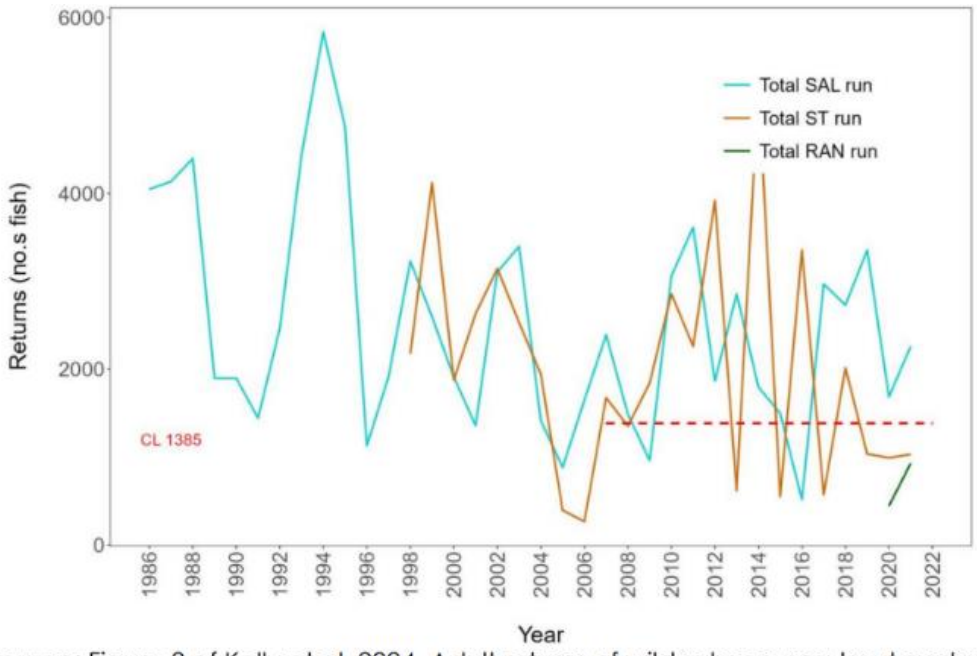
Regulation of sea trout angling

Legally, Atlantic salmon and sea trout are the one and the same in Ireland. For salmon and sea trout angling regulation, salmon and sea trout longer than 40cm are one and the same. Anglers who decide to harvest sea trout shorter than 40cm (maximum daily bag limit of three fish) are not required to attach a blue tag to the harvested fish.

A bye-law prohibiting the retention of all rod caught sea trout has been in place in the Cummeragh River system since 2019 and in the Galway, Connemara and Ballinakill fishery districts since the early 1990s. Apart from the Sea Trout Working Group which reported to the Minister for the Marine during the years 1992-1996 it would appear that no national advisory group for sea trout has been established since. Technical Expert Groups for European eel (TEGEE) and Atlantic salmon (TEGOS) are in existence, but none has been established for the national management of sea trout.

Conservation Limits for Atlantic salmon are available for every river system in Ireland, but no such documentation exists for sea trout. It would appear that sea trout are managed on a reactionary basis and that recreational fisheries are summarily closed to harvest and can remain closed to harvest for decades without adequate review as in the case of recreational sea trout fisheries in the Galway, Connemara and Ballinakill fisheries districts.

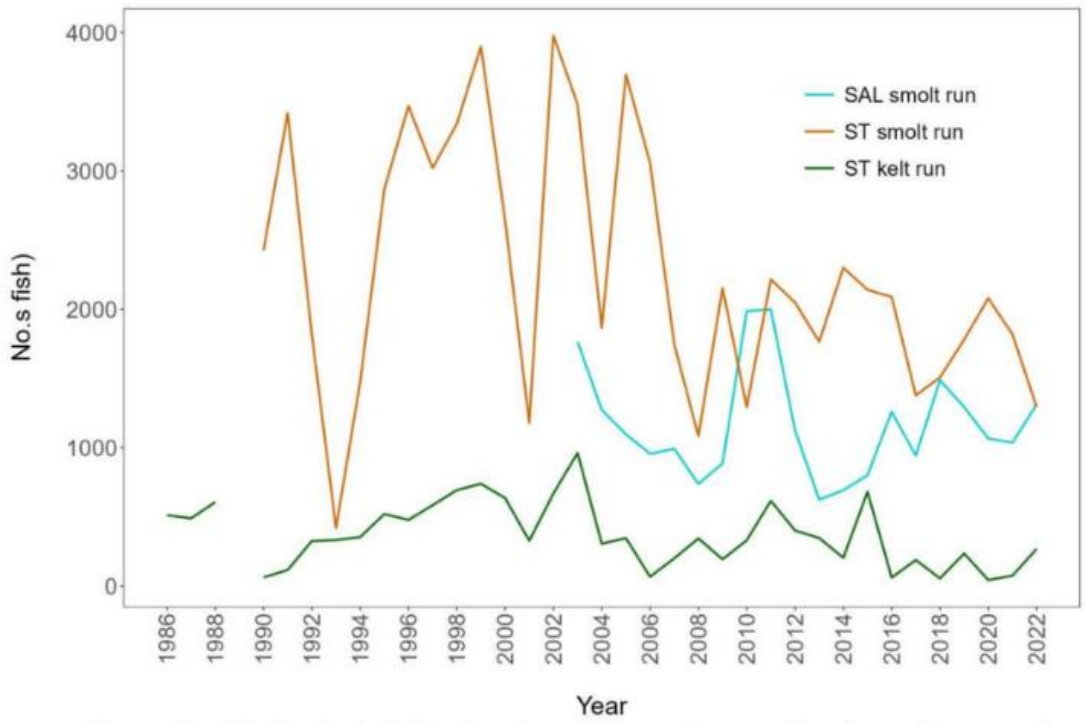
While some information on sea trout counts on fisheries in available on IFI's consolidated fish counter annual reports, the only long term data series available in the public domain is that for the Erriff River (Kelly et al. 2004) which details sea trout counts (upstream) for the Erriff River and also downstream (kelt and immature sea run fish) from the Tawnyard Lough subcatchment (see figure below)



Source: Figure 8 of Kelly et al. 2024. Adult returns of wild salmon, sea trout and ranched salmon to River Erriff since 1986 (conservation limit for wild salmon of 1385 indicated)

In the figure above, salmon counts were at or below the estimated CL in 1996,2001,2005,2009 and in 2016. The years of low sea trout counts were 2005,2006,2013,2015 and 2017. Kelly et al. (2024) do not provide any reasoning for the annual variations in salmon and sea trout counts nor do they provide any commentary on the biological meaningfulness of these sea trout counts as there is no measure of Conservation Limit available for sea trout.

Another long-term data set is also presented in Kelly et al. (2024) which relates to the numbers of salmon and sea trout smolt and sea trout kelt and immature sea run fish migrating downstream from Tawnyard Lough each year since 1986.



Source: Figure 10 of Kelly et al. 2024. Number of downstream migrating salmon and sea trout smolts and sea trout kelts (and immature sea run fish) recorded at the Tawnyard trap since 1986.

The graph above shows large annual variations in the number of sea trout smolt and kelt (and immature sea run fish) the lowest sea trout smolt recorded in 1993, 2001,2008,2010,2017 and 2022. The highest sea trout kelt etc numbers were recorded in 1999,2003,2011 and 2015.The above graphs show that annual numbers of sea trout entering the Erriff River are quite variable as are the annual numbers of sea trout smolt and kelt (and immature sea run fish) migrating downstream from Tawnyard Lough in the Erriff system.

There is one other river system in Ireland, namely the Burrishoole, where upstream and downstream movements of salmon and sea trout have been recorded since the early 1970s. However, since the 1989 / 1990 sea trout collapse in the west of Ireland, the number of sea trout smolt migrating from the system and the number of sea run fish returning to the system have more or less flatlined and no explanation has ever been provided for this catastrophic situation. Anon. (2023) reported that a total of 22 wild sea trout and a further 61 non-silvered trout migrated upstream through the traps in 2022. Of the silvered trout, 8 were adults and 14 (64%) were finnock and that the sea trout smolt run in 2022 amounted to 240 smolts (down from an average of over 4000 during the 1970s).

Clearly, a national effort is required to provide a better understanding of the status of sea trout populations throughout the country and to attempt an explanation as to why some river systems appear to have lost their sea trout population and why others support active recreational fisheries.

MI - Further comments or requests

Wild Atlantic salmon populations from many North Atlantic rivers have declined over the last decades and while many of the issues and challenges related to the freshwater stage are known and managed, the continuing population declines are thought to be driven by a reduced marine survival coincident

with a reduced body size (De Eyto *et al*., 2022[174], Vollset *et al*., 2022[175]). A number of factors affecting marine survival have been proposed from increasing water temperatures (Almodóvar *et al*., 2019[176]), change in abundance of predators (Strøm *et al*., 2019[177]) and food webs (Tyldesley *et al*., 2024[178]), to illegal fishing (Dadswell *et al*., 2022[179]). Many of these factors can in turn be compounded by climate change. The Technical Expert group on Salmon (TEGOS) which provide advice on the management of salmon stocks illustrate in their annual reports the range of factors which individually and synergistically affect marine survival, of which parasites and disease is just one (TEGOS, 2024[180]). Research from Norway suggests that the scale of Atlantic salmon farming in Norway may have a population regulating effect on wild salmonids, at least in an area with particularly intensive production (Vollset *et al*., 2023[181]). However, production in Norway is orders of magnitude higher than in Ireland (ca. 1,400,000 tonnes v 12,000 tonnes).

The International Council for the Exploration of the Sea (ICES) is the oldest intergovernmental organisation in the world concerned with marine and fisheries science. Since its establishment in 1902, ICES has been a leading scientific forum for the exchange of information, the promotion and coordination of marine research and the provision of scientific advice. It is deemed appropriate for the applicant to base their review on advice provided by ICES through the WKCULEF report (ICES, 2016[182]) which provides a succinct and informative review of the information available at that time. On occasion, scientific journals publish comments on previously published articles when scientific opinions may differ. This does not imply that the original article is incorrect, but merely reflects the differing opinions within the profession, as Krkošek *et al*. 2014[183] did regarding the Jackson *et al*. 2013 report[184], which concluded that 'the results of the combined data suggest that while sea lice-induced mortality on outwardly migrating smolts can be significant, it is a minor and irregular component of marine mortality'. The public consultees however failed to acknowledge that the comment by Krkošek *et al*. 2014 was responded to, and defended in Jackson *et al*., 2014[185] which pointed out that, in their opinion, a number of the claims made were 'based on flawed inference'. Similar examples in relation

[174] De Eyto E, Kelly S, Rogan G, French A, Cooney J, Murphy M, Nixon P, Hughes P, Sweeney D, McGinnity P, Dillane M & Poole R. 2022. Decadal trends in the migration phenology of diadromous fishes native to the Burrishoole Catchment, Ireland. Frontiers in Ecology and Evolution 10: 915854

[175] Vollset KW, Urdal K, Utne K, Thorstad EB, Saegrov H, Raunsgard A, Skagseth Ø, Lennox RJ, Østborg GM, Ugedal O, Jensen AJ, Bolstad GH & Fiske P. 2022. Ecological regime shift in the Northeast Atlantic Ocean revealed from the unprecedented reduction in marine growth of Atlantic salmon. Science Advances 8: eabk2542.

[176] Almodóvar, A, Ayllón D, Nicola GG, Jonsson B & Elvira B. 2019. Climate-driven biophysical changes in feeding and breeding environments explain the decline of southernmost European Atlantic salmon populations. Canadian Journal of Fisheries and Aquatic Sciences 76: 1581-1595.

[177] Strøm JF, Rikardsen AH, Campana SE, Righton D, Carr J, Aarestrup K, Stokesbury MJW, Gargar P, Caballero Javierre & Thorstad EB. 2019. Ocean predation and mortality of adult Atlantic salmon. Scientific Reports 9: 7890.

[178] Tyldesley E, Banas NS, Diack G, Kennedy R, Gillson J, Johns DG & Bull C. 2024. Patterns of declining zooplankton energy in the northeast Atlantic as an indicator for marine survival of Atlantic salmon. ICES Journal of Marine Science (in press).

[179] Dadswell M, Spares A, Reader J, McLean M, McDermott T, Samways K & Lilly J. 2022. The decline and impending collapse of the Atlantic salmon (Salmo salar) population in the North Atlantic Ocean: a review of possible causes. Reviews in Fisheries Science & Aquaculture 30: 215-258.

[180] TEGOS. 2024. The status of Irish salmon stocks in 2023 with catch advice for 2024. Report of the Technical Expert Group on Salmon to the North-South Standing Scientific Committee for Inland Fisheries

[181] Vollset KW, Lennox RJ, Skoglund H, Karlsen Ø, Normann ES, Wiers T, Stöger E & Barlaup B. 2023. Direct evidence of increased natural mortality of a wild fish caused by parasite spillback from domestic conspecifics. Proceedings of the Royal Society B 290: 20221752.

[182] ICES. 2016. Report of the Workshop to address the NASCO request for advice on possible effects of salmonid aquaculture on wild Atlantic salmon populations in the North Atlantic (WKCULEF), 1-3 March 2016, Charlottenlund, Denmark. ICES CM 2016/ACOM:42. 44 pp.

[183] Kkrošek, M, Revie CW, Finstad B & Todd CW. 2014. Comment on Jackson et al. 'Impact of Lepeophtheirus salmonis infestations on migrating Atlantic salmon, Salmo salar L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality'. Journal of Fish Diseases 37: 415-417.

[184] Jackson D, Cotter D, Newell J, McEvoy S, O'Donohoe P, Kane F, McDermott T, Kelly S & Drumm A. 2013. Impact of Lepeophtheirus salmonis infestations on migrating Atlantic salmon, Salmo salar L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality'. Journal of Fish Diseases 36: 273-281.

[185] Jackson D, Cotter D, Newell J, O'Donohoe P, Kane F, McDermott T, Kelly S & Drumm A. 2014. Response to M Krkošek, C W Revie, B Finstad and C D Todd's comment on Jackson et al. 'Impact of Lepeophtheirus salmonis infestations on migrating Atlantic salmon, Salmo salar L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality'. Journal of Fish Diseases 37: 419-421.

to sea lice publications include Jansen & Gjerde (2021[186]) and Johnsen *et al*. (2021[187]) as well as Jones & Beamish (2012[188]) and Price & Reynolds (2012[189]), amongst others.

From the references provided by the consultees above, specific to the Irish context, the following points should be noted :

- The studies are based on statistical models with a number of assumptions included and the data used in developing the models are not provided e.g. sea lice numbers, fish numbers.
- At best, the models suggest a correlation with sea lice levels on the farms, however no measurements of sea lice levels on wild salmonids have been performed to corroborate the findings.
- The studies show an overall decline in the number of wild Atlantic salmon returning to the rivers. This was also reported in Jackson *et al.* (2013) however the above listed publications do not refer to any of the Jackson publications (Jackson *et al*., 2011. Aquaculture 320: 159-163; Jackson *et al*., 2011. Aquaculture 319: 37-40; Jackson *et al*., 2013. Journal of Fish Diseases 36: 273-281).
- Atlantic salmon numbers are in decline in many regions, irrespective of whether marine Atlantic salmon farming is present or not.
- In 2022, a total of 26,715 wild salmon were caught by all methods (commercial and angling). Of angling, 22,661 salmon were caught of which 10,348 were harvested with only 54% of salmon caught by angling released.

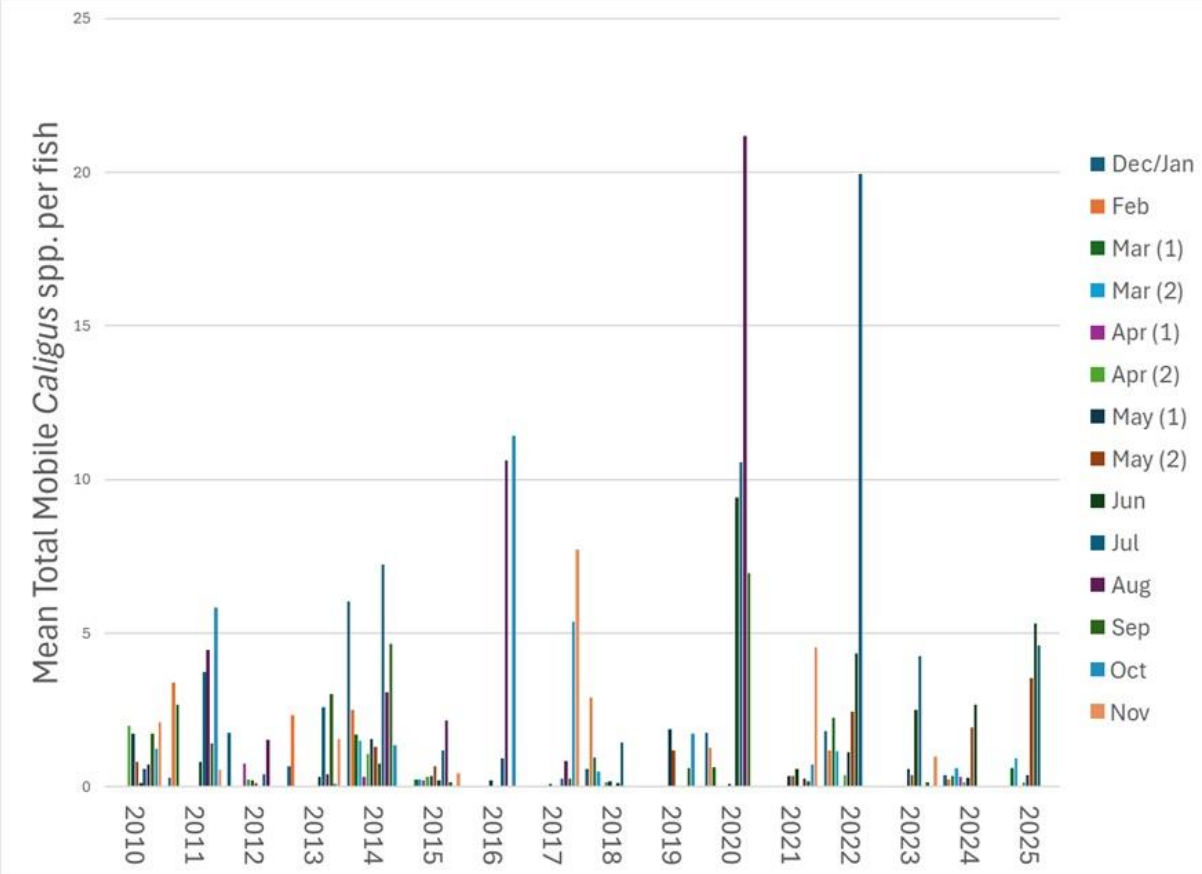
The fact that Ireland has a national sea lice monitoring programme in operation since 1991 indicates the commitment the State has, to managing any potential impact sea lice may have on wild salmonids.

Comment on *Caligus* sp.

The effectiveness of the management of salmon lice at the Deenish site is outlined in Section 2.3.5.2 above. *Caligus elongatus* is a generalist ectoparasite infesting a range marine fish species whereas *L. salmonis* is primarily an ectoparasite of salmonid species and all sea lice monitoring programmes in European Atlantic salmon farming countries are based on *L. salmonis*, which is considered the more serious parasite. Although there have been reports of significant infestations of *C. elongatus* on farms in Northern Norway in recent years, epizootics are extremely rare[190]. Most studies of the pathological effects of caligid infestations on farmed salmonids have been carried out on *L. salmonis*. This is because intensities of *L. salmonis* tend to be higher and the effects on the host more severe than is the case with *Caligus* species. *L. salmonis* is a specialist parasite of salmonids whereas many *Caligus* species such as *C. elongatus*, are much less host specific and therefore more likely to move between farmed salmonids and wild hosts of other species.

Levels of *Caligus* are monitored as part of the National Sea Lice Monitoring Programme and reported for each site annually[191]. A plot of the total numbers of *Caligus* at the Deenish site since 2010 is shown below**.**

[186] Jansen PA & Gjerde B 2021. Comment on "Salmon lice-induced mortality of Atlantic salmon post-smolt during migration in Norway" by Johnsen et al. (2021). ICES Journal of Marine Science 78: 3847-3851.
[187] Johnsen IA, Harvey A, Saevik PN, Sandvik AD, Ugedal O, Ådlandsvik B, Wennevik V, Glover KA & Karlsen Ø. 2021. Reply to jansen and Gjerde's (2021) critique of the salmon louse infection model reported in Johnsen et al. (2021). ICES Journal of Marine Science 78: 3852-3857.
[188] Jones SRM & Beamish RJ. 2012. Comment on "Evidence of farm-induced parasite infestations on wild juvenile salmon in multiple regions of coastal British Columbia, Canada". Canadian Journal of Fisheries and Aquatic Sciences 69: 201-203.
[189] Price MHH & Reynolds JD. 2012. Salmon farms as a source of sea lice on juvenile wild salmon; reply to the comment by Jones and Beamish. Canadian Journal of Fisheries and Aquatic Sciences 69: 204-207.
[190] Hemmingsen, W., MacKenzie, K., Sagerup, K., Remen, M., Bloch-Hansen, K. & Imsland, A.K.D. 2020. Caligus elongatus and other sea lice of the genus Caligus as parasites of farmed salmonids: a review. Aquaculture 522: 735160.
[191] D'Arcy, J., Kelly, S., McDermott, T., Casserly, J., Power, A., Waters, C., O'Donohoe, P. & Ruane, N. 2024. National survey of sea lice (Lepeophtheirus salmonis Kroyer and Caligus elongatus Nordmann) on fish farms in Ireland – 2023. Irish Fisheries Bulletin 55, Marine Institute 37pp.



Levels of total mobile *Caligus* spp. on the farmed Atlantic salmon are generally low, being < 5 total mobiles per fish and are believed to be due in part to the more offshore nature of the particular site. Occasional higher levels are observed which are transient in nature and are most likely due to the migratory nature of other marine fish species which may come into contact with the farm. The fact that these peaks do not persist indicates that on-farm treatments are effective, particularly freshwater bathing as it is known that *Caligus* species are intolerant to lower saline waters.

3.6.1.6 Impact on salmon, sea trout and freshwater pearl mussel stocks

Point raised

No explicit methodological consideration is presented in the NIS or EIA to the potential loss or detrimental population effects on individual wild salmon and sea trout stocks located in the wider vicinity of the proposed salmon farm associated with its operations (likely zone of influence), particularly in relation to the potential effects of increased sea lice loads. Therefore, in regard to the preparation of the Screening AA and NIS, due consideration was not given to EC (2021) Commission notice. Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC. For the Screening AA, this includes the following:
• Description of likely effects on the Natura 2000 sites in view of the specific conservation objectives set out for the designating features, including:
  • disturbance to species, reduction in species populations and density;
  • changes in ecological functions and/or features that are essential for the ecological requirements of habitats and species;
  • interference with the key relationships that define the structure and function of the site.

- Criteria for assessing significance, indicators of significance, in view of the site-specific conservation objectives e.g.:
    - risk of species populations' displacement, level of disturbance, reduction of species home range, feeding area, refuge areas, alteration of favourable condition for breeding;
    - importance of the habitats and species affected, e.g. representativeness, local variety;
    - importance of the site (e.g. limit of distribution area for certain habitats and species, stepping stone, important for ecological connectivity);
    - disruption or alteration of ecological functions;
- For the NIS this includes the following:
    - conservation condition of the species in the site
    - species vulnerability to potential impacts

It is particularly important to consider these in relation to vulnerable and potentially vulnerable stocks in Kenmare Bay and Ballinskelligs Bay including those salmon stocks marginally above or below their conservation limit (CL) or those stocks above CL showing declining trends in their attainment of CL (TEGOS annual reports). The CL is essentially the minimum number of adult salmon a river should have returning to ensure its stock is in a healthy state. In addition, some of the smaller rivers in the vicinity of the proposed operation, although not officially designated as salmon rivers are also known to record small stocks of salmon. In addition, sea trout stocks in Kenmare Bay and Ballinskelligs Bay may be particularly vulnerable to any additional pressures that may result from the proposed operation. Information on these are presented in the following sections but should have been considered in the consultation documents.

There are 14 designated salmon rivers in the Kenmare Bay and Ballinskelligs Bay area in the vicinity of the proposed operation namely: Emlaghmore, Inny, Currane / Waterville (all flow into Ballinskelligs Bay);Owenragh, Sneem, Blackwater Kerry, Finnihy, Roughty, Sheen, Cloonee, Owenshagh, Croanshagh, Lough Fada system, and Kealincha (flow into Kenmare Bay). In addition, these rivers along with the Tahilla and Coomnahorna have sea trout stocks.

In the Killarney National Park, Macgillycuddy's Reeks and Caragh River atchment SAC and River Blackwater (Kerry) SAC the conservation objectives for salmon are to maintain its favourable status and restore its favourable status, respectively. There are also three catchments where pearl mussel is a qualifying interest, namely, the Currane, Kerry Blackwater, and Ownagappul (Lough Fada system) in the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, Blackwater River (Kerry) SAC and Glanmore Bog SAC, respectively.

Freshwater pearl mussel is an endangered species listed under Annex II and V of the EU Habitats Directive and protected under the Convention on the Conservation of European Wildlife and Natural Habitats. It is legally protected in Ireland under Schedule 1 of the Wildlife Act, 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477, 2011) (as amended). As such, any plans developments or activities that may cause undesirable impacts on populations must be fully evaluated.

The location of the salmon farm with a maximum allowable biomass of 2,200 tonnes has the potential to affect wild salmon, an obligate host for pearl mussel larvae, and thereby indirectly effect freshwater pearl mussel. Given the nature of salmon farming there is potential that operations may directly impact wild salmon populations by increasing lice infection rates in wild salmon or through interbreeding which may result in indirect impacts to freshwater pearl mussel. Any increases in marine mortality of salmon and sea trout due to lice infestation from the proposed salmon farm could have significant effects on salmonid population status in these rivers and consequently to freshwater pearl mussel conservation objectives. The conservation objectives for the pearl mussel in the relevant SACs is restore the favourable conservation condition. In addition, under the attribute "host fish" the conservation target is to "maintain sufficient juvenile salmonids

to host glochidial larvae" and states that, "No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time."
IFI consider that all of these fish and mussel populations have the potential to be significant negatively impacted from the operations of the farm as a consequence of increased sea lice loads which may result in both lethal and sub-lethal effects on the salmonid stocks and ultimately result in reduced population sizes. This is not sufficiently considered in the NIS or EIA.
The Screening for AA and NIS Volume 1 – main report incorrectly states that the Blackwater (Kerry) has "approximately 1,500 salmon and grilse entering the river annually". Since 2012 the annual run of adult salmon has been an average of 421 ranging from a low of 143 to a maximum of 675 in this time period. This data is published annually in the Appendices of the Standing Scientific Committee on Salmon and Technical Expert Group on Salmon reports. Indeed, the River Blackwater (Kerry), which also has a significant pearl mussel population reliant on salmonids to successfully reproduce, is now only marginally above its conservation limit and was below it in the period 2014 to 2023. The most vulnerable salmon stocks in the likely zone of influence are the Emlaghmore, Owenragh, Finnihy, Owenshagh, Lough Fada system and Kealincha, all of which have been closed to angling for many years as their stocks are considered to be in a precarious state based on juvenile electrofishing data and / or insufficient data to assess stock status. IFI are not aware of any contact from those responsible for preparing the Screening AA, NIS or EIA to solicit such information from us to better inform their assessments and resultant conclusions. Other rivers in the Kenmare Bay area, although above CL, notably the Roughty and Sheen have shown declining trends stocks in ecent years (TEGOS annual reports). In addition, the Inney stock has fluctuated around its CL in recent years EGOS annual reports). Despite the well-documented declines in our national stock over the last few decades (ICES WGNAS 2023), any further such anthropogenic pressures that may be exerted on such stocks is very concerning and may further inhibit their potential rehabilitation, maintenance or improvement in stock status.
In addition to the above, in the Screening for AA and NIS Volume 1 – main report Table 2.13: SACs designated for Annex II migratory fish species, it should be noted that there are the following omissions as regards SACs where salmon is designated as a qualifying interest, namely:

- River Moy SAC
- The Twelve Bens/Garraun Complex SAC
- River Boyne and River Blackwater SAC
- West of Ardara/Maas Road SAC
- Unshin River SAC

The Lough Currane fishery, situated close to the village of Waterville, is regarded as the premier sea trout fishery in Ireland and is known for its large multi-sea-winter and repeat spawning sea trout. In excess of two thousand sea trout were recorded on the fishery up until 2015 and numbers have declined dramatically since then. There is concern that sea lice emanating from the Deenish Island salmon farm have impacted on out migrating sea trout smolts and kelts and may be responsible for the apparent dramatic decline in sea trout numbers on the fishery. Over the 2006-2013 period, the Deenish Island site had either been fallow or only contained salmon smolts in spring. With the presence of larger grower salmon at the site in recent years, IFI has been concerned regarding the apparent large-scale decline in sea trout runs at the Currane fishery. In this regard, IFI sought submissions on a proposed bye-law to impose catch & release only angling for sea trout in the Currane fishery in 2018. The purpose of the by-law was to seek to reasonably limit the pressure on sea trout stocks in the area of Ballinskelligs Bay and the river systems which discharge into the bay. IFI counter data and catch records indicate that there has been a collapse in sea trout stocks in the general Waterville area. The introduction of a bye-law to prohibit the retention and possession of any sea trout was intended to decrease the pressure on the sea trout stock. The bye-law was Introduced in 2018. In conjunction with is bye-law, IFI initiated a research programme for the Lough Currane/Waterville fishery to investigate the apparent decline in sea trout stocks. The study involves salmonid census data, fish monitoring in freshwater and salmonid monitoring in inshore marine

waters. Each element aims to contribute to the determination of status of different life stages of sea trout and salmon to ascertain if the perceived decline in sea trout stocks in Currane is unique to sea trout and if salmon are also impacted. Against this background, IFI have serious concerns regarding the potential impact of rearing large numbers of farmed salmon at the Deenish site, located 10.8 km from the mouth of the Waterville river on the future viability of Ireland's premier sea trout fishery. The Currane fishery is also an important salmon fishery with a run of both one-seawinter and multi-sea-winter salmon, a qualifying interest in the Killarney National Park, Macgillycuddy`s Reeks and Caragh River Catchment SAC.

In this context, it is also notable that specific conditions related to sea trout were contained in the original licence granted for the operation of the Deenish and neighbouring Inishfanard salmon farms, namely:

- "This licence will remain subject to ongoing review in light of continued monitoring of, and research into, the two marine sites and neighbouring sea trout fisheries which may be undertaken by the Salmon Research Agency and/or the Fisheries Research Centre."
- "In the event of proven contra-indications for sea trout stocks causatively linked to the fish farming operations permitted under this licence, the Minister may exercise his discretion to take any ecessary protective measures ranging from reduction in permitted production levels to revocation of the licence and harvesting of all stock".

IFI are not aware of any such monitoring of, and research undertaken by these bodies or their successors to explore this.

In Section 6.5.1.2. Salmonids of the EIA, in reference to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, it is stated that, "Drift net fishing for salmon was banned at the end of the 2006 season. Draft net fishing has not been licenced since 2014". The latter is incorrect. The Castlemaine mixed-stock commercial draft-net fishery does exploit salmon stocks from the Caragh, Laune and Maine rivers, two of which are within the bounds of the SAC. Furthermore, in the same section, it is stated that, "These rivers and lakes fall under the Waterville rivers and lakes system which is managed by the Inland Fisheries Ireland. This system is utilised for salmon fishing each year with its open season being from 17th January to 30th ." This is incorrect. The system typically closes to salmon fishing on the 30th September and not 30th January.

In the consultation documentation, Amoebic Gill Disease (AGD) is noted as a parasite that may impact farmed salmon and associated pest control measures are outlined to address any outbreaks on the proposed farm. Schall et al. (2022), note that this emerging disease could represent an additional threat to the long-term viability of wild salmon stocks. In their study, the impact of natural exposure to AGD on wild, hybrid and farmed post-smolt Atlantic salmon reared in a sea farm was assessed and it was found that wild fish showed substantially higher mortality levels (64%) than farmed fish (25%). However, no consideration is given to or assessment is made in the NIS or EIA for the potential of an AGD outbreak in the proposed farm operation to cross-infect wild salmon stocks the vicinity of the farm and the resulting consequences that may result for any impacted wild stocks. Further to this, it is unclear where the freshwater for any treatment of AGD would be sourced and this has raised environmental concerns of using lake abstraction in at least one other salmon farming operation in Ireland (IEHC 2021). If this is planned to be taken from a natural source it should be documented in the consultation documentation and any associated effects on the natural source evaluated in accordance with relevant directives and regulations and NIS/ EIA impact guidance.

Given some of the plausible limitations of the hydrodynamic and particle-tracking model used to predict lice dispersal listed under point 4 above, it is very likely that actual dispersal distance of sea lice from the farm could be greater than that shown in Figure 3-10 and 3-11 in Screening for Appropriate Assessment and Natura Impact Statement Volume 1 – Main Report. The actual potential dispersal distance of lice in km is not directly listed but numerous studies using hydrodynamic models coupled to particle tracking or statistical models based on observed lice densities at distance from farm sources or combinations of both have shown typical lice dispersal distances from salmon farms of tens of kilometres away (see Harrington et al. 2023 and references therein). Given that the majority

of these studies are based in sheltered sea lochs, fjords and coastal inlets it is highly plausible that the higher energy coastal currents around Deenish may contribute to similar lice dispersal distances of up to and beyond 10 km, with the predominant surface dispersal direction being landward toward the aforementioned salmon and sea trout rivers owing to prevailing onshore wind conditions in this region.

Points addressed by the applicant

The freshwater pearl mussel (*Margaritifera margaritifera*) is a large filter feeding mollusc found in unpolluted freshwater rivers.

The freshwater pearl mussel has a very unusual life cycle involving a larval stage (glochidia) which must attach to the gills of a host salmonid fish and stay encysted for approximately 9 months before dropping off and settling back on to the riverbed. The juvenile mussels often stay buried in the riverbed for a period of 5 years until they are large enough to withstand the currents of the river.

The populations of European pearl mussel have been in decline over the past century with populations declining by as much as 90%. In Ireland, 27 freshwater pearl mussel populations are protected within 27 Special Areas of Conservation with eight of these populations representing 80% of the total population of Irish freshwater pearl mussels.

Threats to freshwater pearl mussels in Ireland include nutrient enrichment, acute pollution incidents, riverbank erosion, forestry, land change, bog and arterial drainage and loss of salmonid stocks (Moorkens, 1999).

The main reason for the observed decline appears to be the low level of survival of juvenile mussels which are extremely sensitive to slight changes in environmental conditions. For survival, juvenile mussels require clean, well oxygenated water with little silt, sediment or algal growth.

According to the NPWS 'the decline of the freshwater pearl mussel has resulted from failure to recruit young mussels to populations. The cause of these recruitment failures is damage to the species' habitat, specifically through hydrological, sedimentation, other morphological and enrichment impacts'.

In Ireland, the dramatic decline in the number of highest quality river sites in recent years is likely to have been a major factor in the decline in freshwater pearl mussel populations. Just over 30 of these highest quality river sites remain having numbered in their hundreds in the 1980s and 1990s (EPA, 2021).

While the absence of a host salmonid species may also be a factor it does not appear to be as important as the environmental conditions of the river in which the juveniles are found. In an extensive study of 20 freshwater pearl mussel populations across Europe the link between juvenile mussels and the lack of a suitable host species was only rarely observed (Geist et al., 2006). Indeed, recruitment of juvenile mussels was higher in rivers with lower numbers and biomass of host salmonid species compared to rivers with higher numbers and biomass of host species where mussel recruitment was lower or absent. The explanation being that the higher densities of host fish in the non-recruiting streams was due to nutrient enrichment which was resulting in an adverse impact on pearl mussel recruitment.

It follows therefore that the priority for supporting the recovery of freshwater pearl mussel populations will be efforts to address water quality and hydromorphological impacts on rivers with resident populations.

MI - Further comments or requests

Freshwater pearl mussels are covered in detail in the Appropriate Assessment Report. The preferred host for freshwater pearl mussel in this region is Atlantic salmon, which are covered in Section 2.2.5.2 above. Within the sub-basin catchment management plans, it has been stated that host presence is sufficient for the Caragh, Currane and Gearhameen catchments [SAC 000365], the Kerry Blackwater [SAC 002173] and the Ownagappul river [SAC 001879]. The likelihood of impact occurring to the QI

Freshwater Pearl Mussel is very remote; it is concluded that there will be no likely significant effects to the Freshwater Pearl Mussel.

Concerning AGD, in their response to the public consultation, the applicant has stated that they:

- apply good husbandry and management practices under the supervision of a dedicated fish health team, which includes a veterinary practitioner,
- periodically bathe fish in freshwater to repair gill damage caused for marine amoeba, phytoplankton, zooplankton and jellyfish.

In addition, they have confirmed that the water required for such bath treatments will be generated by reverse osmosis filtration of seawater, which will be carried out on the applicant's own vessel MV Aqua Transporter.

The husbandry and management practices referred to above are reviewed during annual inspections carried out by Veterinary Inspectors in compliance with Regulation (EU) 2016 (Animal Health Law) and Regulation (EU) 2017/625 (Official Controls Regulation). Whilst the objective of such practices and treatments is to protect the health and welfare status of the aquaculture animals in the establishment, strong veterinary supervision and appropriate treatments, will also serve to mitigate any potential impact on wild stocks.

3.6.1.7 Threat of fish escapes

Point raised

The Screening for Appropriate Assessment and Natura Impact Statement Volume 1 – Main Report states that, "large escape events have the potential to have a significant effect on wild salmon populations in the area especially considering the low returns within many salmon rivers" and that, "While escapees display considerable potential for long-distance dispersal/migration the incidence of farmed escaped salmon in rivers is correlated with the volume of farming within that region". The report concludes that, "the likelihood of an escape event occurring is remote and MOWI have adopted a range of measures to prevent such an occurrence; consequently, significant direct effects to the Qualifying Feature salmon and indirect effect to the Qualifying Feature freshwater pearl mussel can be excluded".

The EIA notes that the selection of the Deenish site has considered fish escape risk, which increases, for example, in areas exposed to excessively heavy seas or heavy boat traffic and in its Fish Escape Prevention Policy (Appendix 4), MOWI identify the proposed operation at Deenish Island as a "high risk site" for fish escapes, further noting in the NIS that there is, "a High Risk for susceptibility to storm damaged based on the wave climate and hydrographic regime in the locality". In addition, the assessment of the screening AA (Report supporting the Appropriate Assessment Screening of Intensive Aquaculture (T06/202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175), notes that, "A literature review regarding escapees is provided and the potential for significant effect is recognised."

Based on all these statements with regard to the potential for an escape event, a comprehensive assessment should have been made in the NIS and EIA of the potential impact of a large escape event from the up to 650,000 input farm stock on wild salmon stocks in the vicinity of the proposed operation. Indeed, an escape of c. 230,000 farmed salmon occurred from a site in Bantry Bay in 2014 due to storm damage, highlighting the potential for an escape event to occur regardless of the mitigation measures proposed.

There are numerous publications on the impacts of salmon farm escapes on wild salmon stocks (see supporting literature appended). The International Council for the Exploration of the Sea (ICES) workshop to address the NASCO request for advice on possible effects of salmonid aquaculture on

wild Atlantic salmon populations in the North Atlantic (ICES 2016) clearly summarises these in their conclusions as follows:

- The spawning success of escaped farmed salmon is much lower than wild salmon. Despite this, genetic studies have demonstrated that farmed salmon have displayed widespread introgression in a large number of Norwegian populations where this has been investigated.
- Farmed salmon are domesticated and display significant genetic differences to wild salmon in a wide range of fitness-related traits. Whole-river experimental studies have demonstrated that the offspring of farmed and cultured salmon in general, display lower fitness than their wild counterparts in the wild.
- Juvenile escapees and the offspring of farmed salmon compete with wild salmon for territory and food. Therefore, their presence in the natural habitat will reduce the total production of wild fish. Studies have also shown this can result in a decreased overall productivity of the population.
- Where farmed salmon have successfully interbred with natural populations, it is likely that recipient populations will display changes in life-history traits. These changes are likely to be maladaptive for the wild population.
- Wild populations that are already under evolutionary strain from other challenges such as disease pressure, sea lice infection, over exploitation, habitat destruction and poor water quality are more likely to be sensitive to the potential negative effects of genetic introgression and loss of fitness.
- While recognising that there were still uncertainties, the Workshop considered that the evidence relating to the impacts of escapees / genetic introgression provided a clear indication of impacts on wild salmon populations. A substantial reduction of escaped farmed salmon in the wild, or sterilisation of farmed salmon, would be required in order to minimize effects on native populations.

The lack of any environmental impact assessment of the potential threat of an escape of up to 650,000 salmon to salmon stocks in the vicinity of the proposed operation is unacceptable and a major deficit in the consideration of potential impacts in the NIS and EIA documentation

Points addressed by the applicant

No farmed escapees have been reported in Deenish since MOWI began operating the site in 2008. MOWI have implemented a fish escape prevention policy for all farm sites. As well as being fully aware of the potential impact risks of escapees on local wild fisheries (subject to species in question and season), it is essential to the company's commercial viability to contain its fish for harvest. In respect of fish farm escapes, MOWI follows the guidelines on containment of farmed salmonids, drawn up between the North Atlantic Salmon Organisation (NASCO) and the International Salmon Farmers Association (ISFA) (NASCO, 2010).

All floating pen equipment, nets and associated structures are specified to withstand local current and wave climate conditions. Mooring systems are designed to withstand predicted 50-year local wave climate conditions and thus to protect the integrity of the pens. Mooring grid components are inspected annually. Preventative strategies include operating procedures for the use of vessels around pens and the provision of adequate navigational lighting and radar reflectors to prevent damage arising due to navigational errors by noncompany vessels.

Comprehensive net management and maintenance plans and procedures are in place to include regular in-situ net inspections by divers and remote operated inspection vehicles in addition to full net strength testing, inspection and repair after washing in a dedicated net management facility

MI - Further comments or requests

There is always the potential for fish to escape because of extreme weather events like severe storms, from damaged nets, or during operations (such as treating or harvesting). The exposed

nature of this site means there is a real risk of equipment failure, which could result in fish escapes. Advances in pen design, which includes robust pen structures, strong net material and improved mooring components, have dramatically reduced unintentional escapes. Management practices (as detailed in the EIAR Vol. 3) aid in the reduction of escape potential.

Escapes of fish raise both ecological and genetic risks. The primary concern is that they could adversely impact wild stocks, either through competition for food or habitat, disease, or through reproductive mixing (Glover *et al*., 2017[192]; Bradbury *et al*., 2020[193]). Typically, domesticated fish raised in captivity are poor performers and have low fitness in the wild. Escapees quickly become prey to other predators, lessening their potential for food and habitat competition. If farmed fish were to escape and interbreed with wild populations, there could be potential for negative effects on wild populations, such as negative genetic consequences for the mixed population, lowering fitness and potentially limiting the ability of the wild fish to respond to changing environmental conditions. Baskett *et al* (2023)[194] states that long-term consequences of steady, low-level escapes are more detrimental than is the case if the same quantity escape in large numbers at rare intervals or otherwise is highly variable in time. Although minimizing the frequency of very large escape events such as net-pen loss in storms remains crucial, their results suggest that increasing efforts to monitor and prevent constant, low-level leakage from aquaculture operations deserves analogous consideration. Management practices (as detailed in the NIS Vol. 2 appendix) address this concern.

The *Protocol for Structural Design of Marine Finfish Farms (2016)*[195] sets out standards for structural design which a farm must adhere to, and outlines procedures for design-associated record keeping and for review of the design during the operational life of a marine finfish farm.

Fish escapes and Disease risk is addressed in Section 2.2.5 above.

3.6.1.8 Impacts on population & human health

Point raised

According to the EIA non-technical summary, “The renewal of the aquaculture licence will maintain employment and will therefore continue to play a beneficial role to the local communities in the area. The renewal of the licence and approval [sic] proposed licence amendments will have no negative effects on the local population.” In addition, according to the EIA non-technical summary (Human Health section), “The receiving environment for human health in the context of the proposed development is considered with respect to those effects to human population…. and those potential effects to the following factors; … socioeconomics and tourism (including recreation) as relevant to human health” and concludes that the proposed operations, “will not give rise to negative effects on human health”. In the EIA section, 5.1 Population & Socio-economics and section 5.2 Human Health, the assessment respectively concludes that there will be “positive effects on local employment” and “there will be no significant effects”. Furthermore, according to the EIA non-technical summary (Biodiversity section - Fisheries), “Overall, given the measures, controls and monitoring that are [sic] will be in place at the fish farm, there will be no significant effects on fisheries.” No such appraisals of the potential effects on socio-economics and tourism (including recreation) is presented in the EAIR or NIS in relation to the potential effects to wild salmonid fisheries which is set out extensively by us in the above sections. This is not only a particular concern

[192] Glover KA, Solberg MF, McGinnity P, Hindar K, Verspoor E, Coulson MW, Hansen MM, Araki H, Skaala Ø & Svåsand T. 2017. Half a century of genetic interaction between farmed and wild Atlantic salmon: Status of knowledge and unanswered questions. Fish and Fisheries 18: 890-927.

[193] Bradbury IR, Burgetz I, Coulson MW, Verspoor E, Gilbey J, Lehnert SJ, Kess T, Cross TF, Vasemägi A, Solberg MF, Fleming IA & McGinnity P. 2020. Beyond hybridization: the genetic impacts of non-reproductive ecological interactions of salmon aquaculture on wild populations. Aquaculture Environment Interactions 12: 429-445.

[194] Baskett ML, Burgess SC & Waples RS. 2013. Assessing strategies to minimize unintended fitness consequences of aquaculture on wild populations. Evolutionary Applications. pp 1090-1108.

[195] Protocol for Structural Design of Marine Finfish Farms. 2016. DAFM. Link

to IFI but likely also to be a specific concern of other potentially impacted stakeholders. Indeed, the value of the salmon and sea trout tourist angling sector is estimated to have an expenditure in the region of €210 million to the All-Ireland economy and supports 3,235 jobs in this sector (ECSSTAI 2015). Indeed, angling is tourism is estimated to contribute up to 0.15% of mean household income in the remote rural economy of the Waterville area alone (Curtis et al. 2017).

There is no assessment made in the consultation documentation in relation to the potential negative socioeconomic impacts to local and visiting participants involved in recreational salmonid fisheries and local.

Points addressed by the applicant

Recreational and tourism activities in the area currently take place in harmony with the existing aquaculture operation. The renewal application varies from the existing licence in that it requests a change to the boundaries of the existing site and to the operating conditions attached to the licence. If approved, the site boundaries will increase from 14.48ha to 33.48ha and operations will change from 10 pens to 15 pens. The increased site area will not prohibit or impact upon any existing recreational activity in the bay as only an additional 0.63ha of equipment will be visible at the surface. Average annual vessel density for pleasure craft is only 2.67 hours per square metre, and even lower for sailing craft at 0.05 hours per sq. km.

MI - Further comments or requests

The decline in wild salmonid populations undoubtably impacts sport fishing and tourism. The Technical Expert Group on Salmon (TEGOS) who assess Irish salmon stocks annually, list a range of factors which affect marine survival of Atlantic salmon, of which aquaculture (in the form of parasites and disease) are one of many. The aquaculture sector is also an important contributor to remote rural economies. The National Seafood Survey published by BIM states that the aquaculture sector in Ireland was worth €168M, with the finfish sector alone accounting for €101M. The sector also has links with tourism as seen by the Taste the Atlantic initiative, a collaboration between BIM and Failte Ireland promoting seafood producers and products along the Wild Atlantic Way. An assessment on the environmental impacts of the proposed application on wild salmonids is detailed in Section 2.3.5. Impacts on tourism and recreation are detailed in Section 2.7.4.

3.6.1.9 Long term sustainability of Atlantic salmon aquaculture on the context of climate change

Point raised

Deficiencies in assessments of long-term sustainability of Atlantic salmon aquaculture in the context of ongoing climatic and oceanographic change

There is no consideration of the potential impacts that climate change and oceanographic change in the North Atlantic could pose to the long-term sustainability of Atlantic salmon aquaculture in the proposed fish farm site. Chapter three of the Irish Farmed Salmonid Health Handbook (2011) states that “Ongrowing salmon tolerate temperatures between 1-18 °C, and, in Ireland, seem to display a preference for 12-14 °C”.

These figures are generally in accordance with FAO advice regarding Atlantic salmon aquaculture at sea sites, which states that “Atlantic salmon grow best in sites where water temperature extremes are in the range 6-16 °C” (FAO, 2009). However, long-term (2002-present) high-resolution (sub-daily) sea surface temperature records are available from the M3 data buoy, part of the Irish Marine Data Buoy Observation Network , which lies approximately 60 km from the Deenish site. These observed data show that sea surface temperature maxima often exceeds 18 °C during summer months, and this is becoming increasingly apparent in recent years, with each of the 8 most recent summers

(2016-2023) consistently experiencing sea surface temperatures in excess of 18 °C. Furthermore, overall average background August sea surface temperatures for the period 2002-2023 were 16.33 °C, above the stated preference for ongrowing farmed salmon, and in the most recent five-year period this has risen by 0.5 °C, to a mean August sea temperature of 16.83 °C.

Given that contemporary summertime maximum sea surface water temperatures are already exceeding stated industry tolerances for ongrowing farmed salmon, and that background mean temperatures during the warmest part of the year are already in excess of optimal feeding and growth temperatures, the question over the future long-term sustainability of sea cage salmon aquaculture at this site must be critically evaluated – this was not considered in the consultation documentation. This is especially pertinent in the context of future climate projections that sea surface temperatures around Ireland will continue to rise unabated. Indeed a recent report by the Marine Institute (Nolan et al. 2023) specifically indicates the magnitude of near-term projected warming in sea surface and bottom temperatures in the southwest of Ireland by 2035 (within the coming decade). Given this very high uncertainty surrounding the long-term viability of salmon aquaculture at the proposed site and the high potential for ecological damage to be incurred by regional biodiversity in the short-term, it is prudent to weigh any proposed short-term socioeconomic gain associated with salmon aquaculture at this site against compromising the long-term ecological integrity of wild Atlantic salmon and sea trout populations and the immense ecological and cultural services that these species could continue provide across freshwater and marine environments in the long-term.

Points addressed by the applicant

The applicant has operated several farm sites along the coast of Ireland since 1979, with differing temperature profiles and has experience of elevated summer temperature over that period of operation. Given the substantial investment required to operate any farm the applicant would not risk any investment if it were deemed unsustainable. It should be noted that wild salmon and sea trout are exposed to the same temperature profiles as farmed salmonids and as such are exposed to the same potential risks.

MI - Further comments or requests

This issue is further addressed in Section 2.5.2.

3.6.1.10 Deficiencies in the context of Ireland's biodiversity commitments and other plans & projects

Point raised

There is no appraisal given in the consultation documentation to the potential effects of the proposed operations and their alignment with the 3rd National Biodiversity Action Plan 2017-2021 and actions contained therein including those relating to the implementation of OSPAR recommendations on Habitats and Species (OSPAR 2016). In addition, the draft 4th National Biodiversity Action Plan 2023-2030 covering the likely proposed period of the operation of the farm should also be considered in this regard.

Furthermore, there is no evaluation of the proposed operations on how they are in compliance with the NASCO guidance on best management practices to address impacts of sea lice on wild salmon stocks, the stated international goal of which is that 100% of farms are to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms. (NASCO 2009).

Points addressed by the applicant

Ireland's 4th National Biodiversity Action Plan (NBAP) sets the national biodiversity agenda for the period 2023-2030. The Plan contains five Objectives, each addressing a different theme that will contribute to the realisation of the vision for biodiversity. Outcome 2D of the plan (Biodiversity and ecosystem services in the marine and freshwater environment are conserved and restored) sets out a number of actions in order to achieve targets under this heading. MOWI Ireland are fully aware of the commitments that are included in the plan and the 196 actions listed in the plan and are fully committed to supporting those actions that will help improve biodiversity and reduce biodiversity loss.

The Government is developing legislation on Marine Protected Areas (MPAs) and will rapidly progress its implementation to help meet the target of 30% protection in the marine environment by 2030. If the network of MPA's are to achieve their objectives of restoring biodiversity then it is essential that all stakeholders, including MOWI, actively engage in the process. It has been proven in Scotland that MOWI farms can and do operate within and near MPAs without harming the seabed environment and priority marine features, as shown by regular and thorough seabed survey compliance sampling and pre-operational computer modelling.

MI - Further comments or requests

In the National Biodiversity Action plan 2017-2021 aquaculture is identified as an ecosystem service. Aquaculture is not listed as a pressure in either the 3rd or the 4th (Ireland's 4th National Biodiversity Action Plan 2023-2030[196]) action plans. The requirement for impact assessments under several EU Directives (Habitats, Birds, EIA, WFD) ensures that biodiversity is given significant consideration for any proposed developments. All aquaculture sites are assessed to ensure there is no significant adverse effects in and adjacent to Natura 2000 sites. All marine finfish sites are subject to a full Environmental Impact Assessment to assess (and mitigate is appropriate) likely significant effects on the environment.

The NASCO Guidance on Best Management Practices to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (Adopted in June 2009 and Revised in June 2010) outlines Best management practices, reporting & tracking, and factors facilitating implementation to achieve international goals to address the impacts of sea lice and escaped salmon on wild Atlantic salmon. The guidance provides a range of measures from which those most appropriate to the local conditions should be put into place to safeguard the wild salmon stocks. These for sea lice include:

- area management, risk-based, integrated pest management programmes.
- single year-class stocking.
- fallowing.
- risk-based site selection.
- trigger levels.
- strategic timing, methods, and levels of treatment.
- comprehensive and regulated fish health programme.
- lice control management programme.
- adaptive management.
- development and reporting monitoring programmes.
- tracking sea lice loads on wild salmonids.
- tracking sea lice induced mortality of wild salmonids.
- monitoring to check the efficacy of treatments.
- access to a broad suite of management tools.
- regulatory regimes which facilitate alternative sites.
- training to support awareness of impacts.

[196] *https://assets.gov.ie/static/documents/4th-national-biodiversity-action-plan.pdf*

- monitoring of sea lice levels, in areas with and without farms.

Those for containment include:

- codes of practice including operating protocols.
- technical standards of equipment.
- verification of compliance.
- risk-based site selection.
- mandatory reporting of escapes, with details.
- adaptive management.
- number of escapes in rivers and fisheries.
- monitoring of rivers for escapees.
- having site appropriate technology and support technology development.
- advanced permitting to facilitate recapture.
- training to increase awareness.
- assessment of risks.

Many of these principles are incorporated in the licence conditions and monitoring protocols, which are key regulatory tools of the sector, to ensure effective sea lice management and effective stock containment.

3.6.1.11 Deficiencies in assessments and determinations based on "best scientific knowledge"

Point raised

The Screening for AA and NIS report states that its purpose is to provide the competent authority with the necessary information required to conduct the AA and make determinations in view of best scientific knowledge. The assessment of the screening AA (Report supporting the Appropriate Assessment Screening of Intensive Aquaculture (T06/202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175), states that, "Assessments should be undertaken based on the best scientific evidence and methods". The NIS notes that it has examined and analysed, in light of the best scientific knowledge, how the proposed operations could impact on the Qualifying Features of SACs and SPAs and whether the predicted impacts would adversely affect the integrity of protected sites and states that, "there is no reasonable scientific doubt" in relation to its overall conclusion that there is likely to be no significant direct or indirect effects. The EIA concluded that the proposed operations together with the mitigation measures proposed, will not significantly affect the environment.

National and EU guidance documentation on the preparation of Screening AAs, NIS and EIAs highlight the importance of making assessments and determinations based on the best scientific knowledge, evidence and methods. However, this has clearly not been achieved in the preparation of the consultation documentation to support the conclusions made as set out in the above sections. This is particularly notable in relation to assessing the potential impacts of increased sea lice loads associated with the proposed operations and potential farm escapes and their consequent potential effects to proximal salmon, sea trout and pearl mussel populations as well as the potential socio-economic effects that may arise. Indeed, the EPA Guidelines on the information to be contained in environmental impact assessment reports (EIAR) are intended to inform the obligations on those who are preparing EIAs. The Guidelines are also intended to provide all parties in the EIA process with a standard to measure whether EIARs are fit for purpose. Moreover, the Guidelines highlight the importance of the methods used in the preparation of an EIAR to ensure that the information presented is adequate and relevant. They specifically note the following:

The EIAR should consist of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment and the information presented should be relevant and complete and systematically presented and assessed.

The assessment should be conducted with objectivity, and based on high quality scientific information using recognised methods that are presented in a fully transparent manner with clarity.

Baseline information should be sourced from published references to ensure reliability and objectivity and should be sufficient to inform a reliable assessment of the implications for the environment.

Such guidance further highlights the inadequacies of the EIA and NIS, specifically concerning the omission of reference and consideration to a large body of more up to date published peer-reviewed literature from Ireland and internationally demonstrating the impacts of sea lice and escaped farmed salmon on wild salmonids. In IFI's consideration, an objective assessment of this literature is likely to conclude that there is significant reasonable doubt evident in relation to the conclusions made in the application that no significant direct or indirect effects are likely.

Based on the above, we submit that the analysis presented is not sufficient for meeting the needs of an Article 6(3) Appropriate Assessment, or an Article 4 WFD assessment.

Furthermore, it is our considered opinion that the licencing authority should be seeking external reviewers for the modelling data to ensure its scientific robustness.

We are of the view that the relevant authority does not have the data and analysis available to them to be able to conclude beyond reasonable doubt that there will be no impact on the SCIs and QIs of the various Natura 2000 sites under the ambit of Article6(3) of the Habitats Directive.

Ultimately, it is An Taisce's position that the Licence must in fact be refused, as MOWI Ireland have not submitted the relevant information to address the impacts of their aquaculture operations at Deenish Island which have been carried out in breach of the EIA and Habitats Directives.

Points addressed by the applicant

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MI - Further comments or requests

It is the Marine Institute's position that this assessment process, herein, has considered the best scientific knowledge, evidence and methods and provides a comprehensive ecological impact assessment of the project, in relation to direct and indirect impacts that the project might have on its own, or in combination with other plans and projects, on the environment and on Natura 2000 sites in view of the sites' conservation objectives.

3.7 An Taisce

3.7.1.1 Environmental impacts of Deenish sea farm

Points addressed by the applicant

Refer to comment on benthic impact for DHLGH.

MI - Further comments or requests

This topic is addressed in a number of areas throughout this, and other, documents.

3.7.1.2 Sea lice impacts

Point raised

The potential impact of sea lice infestation for wild salmonids is discounted thus in the NIS:

"The continuous weekly monitoring as well as coordinated treatment of all licenced sites within the bay through the Single Bay Management (see Section 2.1.16 for further details) plan once trigger levels have been breached is imperative to minimise any potential risk on wild salmonids. Consequently, it can be concluded that the proposed operations at the site are unlikely to result in significant impact in sea lice infestations in wild salmon populations; consequently there will be no likely significant direct effects to the Qualifying Feature salmon and no likely significant indirect effects to the Qualifying Feature freshwater pearl mussel"

While the NIS provides a modelling exercise for lice, we would note that the operators of this plant are alleged to have previously stocked the farm at 122% of what they were licenced for, and, short of a change in approach in terms of monitoring and enforcement of the stocking density for this operator, then the licencing authority cannot be confident that the limit will be respected. That, in turn, raises reasonable scientific doubt as to the infection potential of the farm. We submit that this is a significant uncertainty, and given the alleged track record of the applicant, unless far stricter inspection and enforcement is guaranteed then the scientific doubt remains, in conflict with Article 6(3) of the Habitats Directive.

Additionally, anecdotal evidence from the very reputable Inland Fisheries Ireland indicates that there are serious concerns in regard to the impact of the salmon farm on wild trout and salmon. Inland Fisheries Ireland clearly outlined in their 2019 submission to ALAB2, in regard to the revocation of the MOWI licence, how with an increase in the number of salmon being reared at the Deenish salmon farm there was a corresponding dramatic decline in Sea Trout numbers, as a result of sea lice infestation from the Deenish Salmon Farm. They made their concerns regarding the salmon farm very clear, and clearly welcomed the revocation of the licence.

Furthermore, we note that MOWI seeks to rely on a study from 2013(Jackson et al., 2013), which downplays the overall impact of lice on wild salmon. However, there have been clear examples of lice infestation of wild salmonids as a result of farmed salmon, and the international literature is testament to that. Specifically, in the Irish context, a study by Shephard and Gargan (2020) shows that salmon returns on five rivers on the West coast between 1990 and 2019 dropped by between 19% and 46% in the years following high lice levels on nearby salmon farms. Similarly, a previous study by Shephard and Gargan (2017) demonstrated a 50% decrease in the salmon run largely attributable to lice infestation on farmed salmon. In a similar piece of work, highlighted by IFI, an extensive review by Thorstad et al (2015) assessed the impacts of the salmon louse on sea trout. They concluded that intensively farmed areas have negatively impacted wild sea trout populations by increasing marine mortality, changes in migratory behaviour, reduction of marine growth and reduced population sizes.

Given the anecdotal evidence of a collapse in the local salmonid population, which coincides with an increase in stocking density on the Deenish Island farm, combined with Irish studies demonstrating measurable impact as a result of salmon farms, and the large scale review of salmon farm impacts on sea trout, it becomes increasingly difficult to believe the conclusion in the NIS that there will be no likely significant direct effects as a result of sea lice emanating from the salmon farm.

The requirement for certainty when carrying out an Appropriate Assessment has been clearly fleshed out in case law. It is now very well established in law that approval can only be granted for plans and projects when it has been established beyond all reasonable scientific doubt that the subject proposal will not adversely impact any Natura 2000 sites. In CaseC-258/11, Sweetman & Others v An Bord Pleanála & Others, the CJEU held that:

"authorisation for a plan or project ....may therefore be given only on condition that the competent authorities ....are certain that the plan or project will not have lasting adverse effects on the integrity of the site. That is so where no reasonable scientific doubt remains as to the absence of such effects" [emphasis added].

In Kelly v An Bord Pleanála & Ors. [2013 No 802 J.R.], with reference to Commission v Spain c-404/09, the High Court held in para. 36 that the competent authority must carry out an AA for a plan or project in light of the best scientific knowledge in the field and that the final determination of the competent authority must include complete, precise and definitive findings. The case repeated the conclusion of the CJEU at para. 44 in Case C-258/11, namely that an AA:

"cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt."

This test has not only been established in Irish law but further developed in recent case law, with reference to the Kelly judgement, in Connelly v ABP [2018] IESC 31 (paras. 8.15 & 8.16) and Foley v EPA & Ors and Hayes v EPA & Ors [2022] IEHC 470 (para. 118).

We would observe in this case that the only evidence upholding the conclusion that there will be no significant impact on the QI of the nearby SACs as a result of sea lice relies entirely on modelling carried out by MOWI. There is extensive evidence highlighting that this is likely a flawed conclusion, and we submit that it is incumbent upon the licencing authority to seek external independent validation of any modelling work before relying on it. This is particularly pertinent given it appears to conflict with a large body of published literature on the impacts, and with very plausible anecdotal evidence provided by the IFI on this issue.

Points addressed by the applicant

Refer to comments elsewhere in this document on sea lice

MI - Further comments or requests

The Appropriate Assessment Report documents provide an assessment based on the application in hand. These issues are addressed at various points within the Appropriate Assessment documents, and within the EIAR and this document.

3.7.1.3 Water Framework Directive and Water Quality

Point raised

In Case C-461/13 Weser the CJEU held:

"Article 4(1)(a)(i) to (iii) of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy must be interpreted as meaning that the Member States are required

- unless a derogation is granted
- to refuse authorisation for an individual project where it may cause a deterioration of the status of a body of surface water or where it jeopardises the attainment of good surface water status or of good ecological potential and good surface water chemical status by the date laid down by the directive."

However, we would argue that although the EIAR does address elements of water quality, it does not actually carry out a WFD assessment, as required by law.

Water chemistry is just one of a number of quality elements which must be assessed under the Water Framework Directive. The assessment in the EIAR does not consider the WFD requirements holistically, rather it looks at specific things like nitrate pollution and Biological Oxygen Demand. According to the judgment in the Weser case, where any single quality element is reduced in class,

even if it doesn't amount to an overall decline in the status of a WFD waterbody, that must be still considered a deterioration. We submit that no such assessment has been provided by the application. The decision maker must ensure that the point source responsible for discharges of nutrients and therapeutants does not lead to a deterioration in any of the quality elements in the surrounding waterbodies.

Points addressed by the applicant

The EU Water Framework Directive (Directive 2000/60/EC) establishes a framework for the protection of inland surface waters, transitional waters, coastal waters, and groundwater. It aims to prevent and reduce pollution, promote sustainable water use, protect and improve the aquatic environment and mitigate the effects of floods and droughts.

In Ireland, the WFD is transposed by the following national regulations:

• European Communities (Water Policy) Regulations (2003 and 2014) and.

• European Union Environmental Objectives (Surface Waters) Regulations (2009, 2012, 2015 and 2019)

Under the WFD, a water body is the basic management unit used to assess if the environmental objectives for that water body have been met.

The key environmental objectives of the WFD are set out in Article 4 of the Directive. It requires member states to use their River Basin Management Plans (RBMPs) and Programme of Measures (PoMs) to protect and, where necessary, restore water bodies to reach good status, and to prevent deterioration. Good status means both good chemical and good ecological status.

The Deenish Island Salmon Farm is in the Southwestern Atlantic Seaboard (HA 23) coastal water body which extends from Outer Dingle Bay in the north to Dunmanus Bay in the south and covers an area of 1,540 square kilometres. This water body is characterised as being exposed, mesotidal and saline in character (euhaline).

The most recent assessment from the Environmental Protection Agency for the period 2016-2021 shows that this water body is in high ecological status which is the highest ecological status a water body can be in under the WFD assessment system (EPA, 2022). This indicates that this water body is showing no or only minor evidence of human disturbance in the context of the EU Water Framework Directive.

This assessment is based on monitoring results undertaken by the Marine Institute (Data - Catchments.ie - Catchments.ie) which show that the concentration of dissolved inorganic nitrogen (DIN) is below the environmental quality standard established in national regulations implementing the Directive, namely the European Union Environmental Objectives (Surface Waters) Regulations(2009, 2012, 2015 and 2019).

Furthermore, concentrations of dissolved inorganic phosphorus (DIP) in this water body are also well below the environmental quality standard established for this parameter in the Surface Water Regulations although it should be noted that this standard only applies to transitional waters and not coastal waters.

However, both the concentration of DIN and DIP observed in this water body are at satisfactory concentrations being below the area specific OSPAR assessment thresholds established by Ireland under its obligations as a contracting party to the OSPAR Convention. Indeed, this water body has been classified as a non-problem area about eutrophication under the OSPAR Common Procedure (Integrated Assessment, 2017) for assessing nutrient enrichment which means there is no evidence that anthropogenic enrichment has disturbed or may in the future disturb the marine ecosystem in which this water body is found.

This is consistent with the results obtained from the 3-dimensional hydrodynamic water quality monitoring which show that DIN concentrations outside the licensed area easily meets the

environmental quality standard for DIN and is less than 0.005 mg/l of N within a relatively short distance of the boundary of the farm. Similarly, DIP concentrations (<0.005 mg/l of P), outside the proposed licensed area are also well below the EQS set for transitional waters under the WFD but also well below the OSPAR area-specific assessment threshold (0.025 mg/l of P) for this parameter.

The modelling outputs are also consistent with the empirical observations on the almost negligible impact of salmon farming on water quality in an exposed Irish coastal embayment, similar in setting to the Deenish Island salmon farm.

O'Donohoe et al. (2000) in a review of a water quality dataset collected over 15 years from 11 sites in Kilkieran Bay where intensive salmon farming has been ongoing since 1984, these authors could not identify any measurable impacts on water quality over that period. In the discussion section of their report, they state "Given that the seasonal cycle of nutrients at each sampling station was typical of north temperate coastal waters and that no significant trends in the temporal levels of nutrients were observed, it can be concluded that there is no indication that fish farming in Kilkieran Bay has caused any detectable change in the levels of inorganic nutrients" and that "comparison of pre-salmon farming data and post-salmon farming data from one site indicates that the levels are similar in concentration." The report notes that other studies in Norway, the USA and Scotland all report similar undetectable increases in dissolved nitrate from marine salmon farms (see Ervik et al., 1985, Weston 1986, and Gowen and Bradbury, 1987).

It can be concluded that Deenish Island salmon farm is having a negligible impact on water quality.

Under the requirements of the Water Framework Directive the national competent authority is required to undertake an assessment to determine if a project is likely to result in deterioration of the status of the body of water concerned or to jeopardise the attainment of good surface water status, unless the view is taken that that project is covered by a derogation under Article 4(7) of the Directive.

In the first instance, the responsibility for undertaking such an assessment lies with the relevant national competent authority, and not MOWI Ireland.

MI - Further comments or requests

A report *Water Framework Directive Compliance Report of the intensive finfish aquaculture licence application T06-202 at Deenish Island, Co. Kerry* (Oct 2025) has been undertaken to determine whether specific components or activities associated with the Deenish aquaculture licensable activity (T06-202) will compromise WFD objectives or result in a deterioration or prevent the improvement of the status of any waterbodies in the vicinity of the proposed aquaculture site.

3.7.1.4 Bird impacts

Point raised

The location of this salmon farm is within the Deenish Island and Scariff Island SPA (Code 004175). Deenish Island and Scariff Island SPA is a site of high ornithological importance on account of the internationally important population of Storm Petrel and nationally important populations of Manx Shearwater, Fulmar, Lesser Black-backed Gull and Arctic Tern. It is also worth highlighting that the aforementioned Storm Petrel and Arctic Tern species, as well as Chough, are listed on Annex I of the E.U. Birds Directive. According to the NPWS, these islands support important populations of breeding seabirds. The Seabird 2000 survey recorded 1,960 pairs of Manx Shearwater on Scariff Island and 351 pairs on Deenish Island in 2000, giving a total of 2,311 pairs which is equivalent to c. 5% of the national total5. On Deenish Island, birds breed in burrows on steep grassy slopes with rock outcrops in a limited area on the south-east side of the island. Deenish Island is also a traditional site for nesting terns, with 54 pairs of Arctic Tern present in 1995 -a population of national

importance. Other seabirds which were recorded breeding in 2000 include Shag (5 pairs), Herring Gull (28+ pairs), Great Black-backed Gull (7 pairs) and Black Guillemot (several pairs).

Potential impacts on birds are outlined in the NIS:

"The greatest potential impact from human activity will be associated with boat movements around the site. The sensitivity of various high conservation value species to such impacts will vary"

The NIS then proceeds to enumerate the risk to birds using a metric based on various aspects of the bird's reaction to disturbance, endangered status and habitat flexibility, and concludes that:

"The likelihood of impacts occurring is remote; it is concluded that there will be no likely significant effects."

We are of the view that the chosen metric is unfit for purpose, and results in an overly positive assessment of the potential impacts on the protected species of this SPA. The NIS seeks to rely on a composite metric, which includes measures of species habitat suitability and species habitat flexibility. We would highlight that this is irrelevant in this context. Habitat flexibility estimates if a species is very flexible in habitat use, or if it is reliant on one particular habitat type; and habitat suitability assesses how likely a species is to use a particular habitat.

The Deenish Island and Scariff Island SPA's high ornithological importance is demonstrated by it's support of important populations of breeding seabirds. The Seabird 2000 survey recorded 1,960 pairs of Manx Shearwater on Scariff Island and 351 pairs on Deenish Island in 2000, giving a total of 2,311 pairs which is equivalent to c. 5% of the national total.6As such, the impact on nesting species is the issue here, not their ability to nest or forage elsewhere. The SPA was designated because it is suitable for the species, and they naturally occur there. As such, assessing if they could utilise other habitats, or whether the existing habitat is suitable for them is moot. This is an area protected for the sole reason that it provides them with the habitat which they favour.

The impact of boat disturbances to these nesting bird species is entirely absent from the NIS, despite this being clearly identified in the NIS as having the greatest potential to impact on bird species. The energetic cost to the birds, and potential risks to their breeding success as a result of the flushing of birds due to boat traffic has not been assessed at all within the NIS.

As such, the information which is necessary for the decision maker to reach a conclusion beyond all reasonable scientific doubt is absent. Habitat flexibility is irrelevant given that Deenish Island is designated for the protection of breeding birds, no activity which requires the species to be flexible in their nesting choice should be licenced within the SPA. Likewise, the habitat suitability exercise is irrelevant as these species occur naturally on Deenish Island and are protected in that location. It is not up for debate whether the habitat is suitable for them or not. As such, the assessment of impact significance is not fit for purpose in this case, and we submit that it cannot be relied upon by the decision maker. Until such a time as the impact of daily boat disturbances can be enumerated and discounted for each of the SCI species within the Deenish Island and Scariff Island SPA, any decision made cannot be considered to have reached the acceptable threshold for the decision maker to be able to conclude beyond reasonable scientific doubt, and as such will be non-compliant with Article 6(3) of the Habitats Directive.

Points addressed by the applicant

The Species of Conservation Interest for this SPA include Manx Shearwater, Storm Petrel, Fulmar, Lesser Black-backed Gull and Tern spp. These species only occur at the SPA during the breeding period (ca. late March – mid-August) and for the other seven months of the year, they migrate either offshore to over-winter in the open ocean or in Iberia and both North and southern Africa. During that period, they cannot, therefore, be affected by the fish farm.

Manx Shearwater, Storm Petrel and Fulmar feed in offshore locations during day light hours (or for far longer periods of time), leaving their mates and return to the nest at night. They therefore will not be impacted by activities on the fish farm. Manx Shearwater nest in holes in the ground while Storm Petrel nests are cryptically hidden in holes in walls or under vegetation and therefore the bird that remains at the nest while its mate has gone foraging, will not be affected by activities at the fish farm. Fulmar nest on shelves of steep cliff faces ca. 10m above the levels of the highest wave action. Observations of a colony on Friar Island, Co. Galway since 2000 has shown that the sitting birds will not leave the nest even if the boat approaches the bottom of the cliff face to within 5m (B. O'Connor, pers. obs.). As the farm is ca. 200m distant from Deenish, the sitting birds will not be impacted by activities at the farm.

As for the many gull species, Lesser Black-backed gulls are gregarious and are not sensitive to humans or human activities. They nest on a variety of habitat types e.g., islands, islands on lakes, coastal cliffs and even on tops of buildings. As the farm is ca. 200m distant from Deenish, the birds will not be impact by activities at the farm and may even forage at the farm.

Arctic Terns breed in colonies both on the coast and on lake shores. Like gulls, they are gregarious and are not affected by human activities. They will therefore not be impacted by activities on the farm

MI - Further comments or requests

The methodology used by the applicant to assess the risk of the renewal site is adapted from published methods for assessing the impacts of ORE development on bird species as outlined in the EIA document (Garthe & Huppop 2004; Furness et al. 2013, 2013). In lieu of up to date real survey data on seabird distributions in this area (NB. The first ObSERVE aerial programme did not map seabirds in this area) with which accurate overlaps could be delineated then risk assessments are the next best available method.

The habitat suitability scoring has been misinterpreted by the respondent to mean 'habitat suitability assesses how likely a species is to use a particular habitat' when in fact habitat suitability is about how suitable the licenced area is for that particular species. This provides an idea of how important the licensed area might, or might not, be for any given seabird species and thus the level of risk posed by the activities to that species.

MI agree that the impact of boat disturbances is an important factor for assessing the risk to seabirds particularly where habitat flexibility is low and habitat suitability of the site might be high. There are very limited studies in the literature about the impact of disturbance on seabirds at a population level and linking disturbance to breeding success would be incredibility difficult. The disturbance assessment used in the EIA is linked to actual observations at ORE sites from the Garthe & Huppop (2004) publication and therefore represents a reasonable assessment of the distance at which birds display disturbance behaviour and the subsequent fleeing distance. These factors are linked directly to individual energy expenditure and thus overall individual fitness.

The nature of the licensed activity ensures that there is a naturally occurring buffer zone whereby pens are placed in waters >20m depth and the surface structures of the farm will therefore be a distance away from any nesting or commuting birds, ensuring disturbance is avoided at the nest site or the immediate vicinity which may be used for foraging.

Overall, the MI considers the findings of the NIS to be reasonable. The proposed activity will not significantly reduce the natural range available, or the size of habitat available, for the QIs and it will not hinder the ability of these QIs to maintain their populations as a viable component of the natural

habitat on a long-term basis. There will be no significant adverse effects on the ornithological QIs of these SPA sites.

3.7.1.5 Otters

Point raised

Otters are known to occur in the Kenmare River SAC, in which the salmon farm site falls. The AA screening outlines that:

"While otter is more an aquatic rather than a truly marine mammal, they are widely distributed in the SAC (Saunders, 2017) and so may occur within the proposed project area; consequently, potential effects to the otter cannot be excluded at the screening stage. Otter is brought forward to the Stage II AA NIS"

The NIS outlines that Otters forage and feed within 80m to 100m of the coastline and can travel distances up to 500m across estuaries or between islands, but discounts them interacting with the farm site thus:

"Although the proposed aquaculture renewal site is located within the Kenmare River SAC, the distance from the coastline of Deenish Island where otters can forage, is too significant for them to be found at the site.The likelihood of an impact occurring on otters is remote, the consequence of an impact if realised is negligible; it is concluded that there will be no likely significant effects to otter."

However, from the documentation on the NPWS site for the SAC, this does not seem to be entirely accurate. The following is a map of an Otter commuting bufferzone in the area, and clearly incorporates the entire boundary of Deenish Island, including the location of the fish farm.

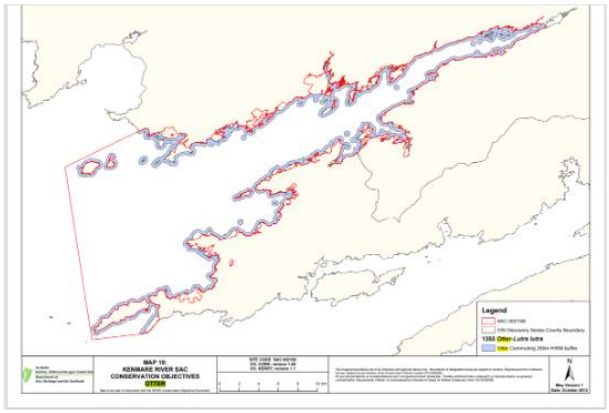

Figure 1: Map from NPWS Conservation Objectives for Kenmare River SAC[7]

As such, we would argue that the conclusion that there will be no impact is not scientifically robust. The CJEU at para. 44 in Case C-258/11 clearly states that an AA:

"cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt."

We would highlight that we do not believe the information provided in the NIS in regard to otters is accurate, given it appears to conflict with the information provided by the NPWS on the SAC. Further information should be sought from the licencing authority on otter movements in the vicinity of the salmon farm.

Points addressed by the applicant

This is a widespread species that can live near humans. Observations at the mouth of the River Corrib over a 5 year period showed that they are present both in early morning and late evening but were

also seen in day light hours feeding in the Claddagh Basin where pedestrians and cars were passing by. No impact on the population of otter in Kenmare River is predicted due to activities on the farm and Deenish Island

MI - Further comments or requests

This point is addressed in Section 2.3.4.

3.7.1.6 Escapees

Point raised

The risk of farmed salmon escaping from their pens to interbreed with wild salmon is a significant ecological concern. However, the NIS discounts the risk thus:

> *"By and large, escapees are more likely to die or be preyed upon at sea than to enter a river system, in particular if they are immature, which is the most likely prospect"*

But instances of farmed salmon being caught in inland rivers would cast doubt on this assertion. Indeed, IFI were quoted in this8article saying:

> *"This large number of escaped farmed salmon, with a high proportion of males likely to be sexually mature, presents a potential threat to local wild salmon populations,"*

The NIS relies on standard MOWI operating procedures to minimise the risk:

> *"Preventing the escape of fish is a priority for MOWI Ireland. MOWI has an improved standardised pen, net and mooring design adopted on all farms. They have classified their sites in Kenmare Bay as having a High Risk for susceptibility to storm damage based on the wave climate and hydrographic regime in the locality. Pen, mooring and anchor design within Kenmare Bay reflects this and strongly mitigates against storm damage thus reducing the risk of an escape event"*

It should be noted that MOWI Ireland are responsible for circa 80% of farmed salmon production in Ireland, and in its report to NASCO in 20199Ireland reported that 800,000 farmed salmon had escaped from marine sites between 1996 and 2017. Elsewhere in Europe, MOWI protocols do not appear to be enough to withstand increasing storm events, with an incident at a Scottish MOWI salmon farm in 2020 seeing the escape of almost 50,000 farmed salmon in one instance10. Despite this, the risk of future climate disruption in the guise of increased storm strength does not appear to have been factored into their risk analysis for this farm.

Furthermore, the applicant seeks to minimise the seriousness of escapees, highlighting that large escapes have greater potential for impact:

> *"Large escapes (tens of thousands of individuals) of mature fish in the spawning season have a greater potential for impact significance than small escapes of smolts. Large escape events have the potential to have a significant effect on wild salmon populations in the area especially considering the low returns within many salmon rivers. However, the likelihood of an escape event occurring is remote and MOWI have adopted a range of measures to prevent such an occurrence; consequently, significant direct effects to the Qualifying Feature salmon and indirect effect to the Qualifying Feature freshwater pearl mussel can be excluded"*

While accurate, that does not diminish the risk from a smaller escape event. The risk is based not just on the number of escapees, but also on their level of maturity and the time of year of the escape event. The obligation on the decision maker in this instance is to determine if there is any risk to the integrity of the SAC, not to consider the acceptability of the quantum of risk posed. If there is any risk that the integrity of the SAC will be undermined, then the licencing body is obliged to not licence the activity. In Case C-258/11, Sweetman & Others v An Bord Pleanála & Others, it was held that:

"*authorisation for a plan or project ....may therefore be given only on condition that the competent authorities ....are certain that the plan or project will not have lasting adverse effects on the integrity of the site. That is so where* ***no reasonable scientific doubt remains*** *as to the absence of such effects" [emphasis added].*

Points addressed by the applicant

No farmed escapees have been reported in Deenish since MOWI began operating the site in 2008. MOWI have implemented a fish escape prevention policy for all farm sites. As well as being fully aware of the potential impact risks of escapees on local wild fisheries (subject to species in question and season), it is essential to the company's commercial viability to contain its fish for harvest. In respect of fish farm escapes, MOWI follows the guidelines on containment of farmed salmonids,drawn up between the North Atlantic Salmon Organisation (NASCO) and the International Salmon Farmers Association (ISFA) (NASCO, 2010).

All floating pen equipment, nets and associated structures are specified to withstand local current and wave climate conditions. Mooring systems are designed to withstand predicted 50-year local wave climate conditions and thus to protect the integrity of the pens. Mooring grid components are inspected annually. Preventative strategies include operating procedures for the use of vessels around pens and the provision of adequate navigational lighting and radar reflectors to prevent damage arising due to navigational errors by non-company vessels.

Comprehensive net management and maintenance plans and procedures are in place to include regular in-situ net inspections by divers and remote operated inspection vehicles in addition to full net strength testing, inspection and repair after washing in a dedicated net management facility.

MI - Further comments or requests

Fish escapes and Disease risk is addressed in Section 2.2.5 above, and in Section 3.6.1.7.

4 Public Consultation

Pursuant to Regulation 8 of SI 236/1998 – Aquaculture (Licence application) Regulation, as amended, a public consultation was held on the proposed aquaculture and foreshore application. The issues raised from the public consultation, as well as responses to those raised issues from the applicant, are presented in the following tables. Comments are categorised by the applicant in their response, grouped by similar topics, and compiled to facilitate a succinct response (as in Table 4-1). These topics are addressed in the sections following, or in the Prescribed Bodied Consultation section previously. Some of the more detailed issues are addressed individually to elaborate further. These detailed responses reflect and incorporate the issues raised in a number of other responses. Other issues raised are addressed individually and not incorporated in Table 4-1. The Marine Institute provides further commentary on some issues.

The topics are referenced with regard to the sections within the applicants NIS that address these issues. Issues that do not have a reference, or merit further elaboration, are addressed in the text boxes below.

Table 4-1 Issues raised and broad category assignment, with details of the section in the Applicants NIS and EIAR document which addresses these topics.

OBJECTION COMMENTS (redacted)	Subject	NIS Section	EIAR section
There has been issues in recent years with algal blooms in the area of the site which most likely is related to nitrates emanating from the salmon farm.	Algal blooms		
Biodiversity loss on seabed	Benthic impact	3.3.2	App. 6
Destroys all life beneath the farm	Benthic impact	3.3.2	App. 6
Malfunctioning feed pipe throwing out feed for hours	Benthic impact	3.3.2	App. 6
Open-pen farms allow fish faeces, excess food and sea lice chemicals to drop to the sea bed under the pens, these areas then become barren and toxic to other forms of sea life.(source Irish Times 26/01/2023)	Benthic impact	3.3.2	App. 6
Barren and toxic seabed due to faeces, food, and sea lice chemicals dropping to the seabed.	Benthic impact	3.3.2	App. 6
Images beneath farm in EIA show sludge which may turn the seabed anoxic and toxic-not in line with Nature Restoration Law.	Benthic impact	3.3.2	App. 6
Anecdotal accounts of divers observing the mountains of excrement under the salmon cages.	Benthic impact	3.3.2	App. 6
Deenish failed its last benthic test.	Benthic impact	3.3.2	App. 6
EIA claims that there will be no impact on the environment around, under or at distance from the cages and yet it also says “The fallowing of the site at the end of harvest will see no smolts present at the site which will allow time for the marine environment to recover”	Benthic impact	3.3.2	App. 6
Having dived on the reefs adjacent to the fish farms I have seen toxic bottom sludge spread into the adjoining areas.	Benthic impact	3.3.2	App. 6

Waters around Deenish identified as a high biodiversity "Area of Interest" by June 2022 Fair Seas publication	Biodiversity	Ref NIS	
Disturbance to cetaceans due to noise/anchor chains/traffic. Report of MOWI over using them in Scotland.	Cetaceans	2.2.6	6.3.1/6.3.2
Impact of removing wild cleaner fish and what happens post captivity	Cleanerfish management	App. 3.3	App. 3.3
Wild cleanerfish being taken from bays without any proper assessment of impact	Cleanerfish management	App. 3.3	App. 3.3
Wrasse like sprat isn't a quota species however the unsustainable nature of the sprat and wrasse fisheries, connected to fin fish farming is undeniable.	Cleanerfish management	App. 3.3	App. 3.3
Warming sea temperatures raises questions about the viability of the operation	Climate change		
Cramped pens	Density		2.8
Salmon farms contain hundreds of thousands of fish in foul cages.	Density	Appendices	2.8
High-density conditions in fish farms can facilitate the spread of diseases among the fish, requiring the use of antibiotics and other chemicals.	Density	2.8	2.8
Escape/interbreeding risk	Escapes	3.5.6	6.5.6
Genetics damaged by escapees (in general - not Deenish)	Escapes	3.5.6	6.5.6
High risk of escape	Escapes	3.5.6	6.5.6
Escapes generally occur during transfers in and out of farms but also due to adverse weather conditions-threat due to interbreeding with wild fish	Escapes	3.5.6	6.5.6
Escapee fish can spread AGD which is at epidemic levels at Deenish and there's no reason to believe that they haven't escaped	Escapes	2.1.15.6/3.5.6	2.14.6
No fallow period with Deenish and Inishfarnard being open 12 months a year	Fallowing	2.1.9	2.8
Accessibility to a safe harbour will be cut off by the new layout of pens obstructing Deenish Island Bay. With the obstruction to the bay and increased fish loads this may alter the natural habitat of this bay in an SAC. With the obstruction to the bay local recreational boat users and sea fishers will not be able to access the sheltered waters of Deenish Bay.	Farm layout		11.2/11.4
Extraction of wild fish/sprat for fish meal	Feed ingredients	2.1.10	2.9
Farm fish being fed by industrial herring fishing, being mashed into meal at Killybegs, put on trucks and driven to Deenish?	Feed ingredients	2.1.10	2.9
Uncontrolled taking of fodder fish around Ireland to provide fish meal	Feed ingredients	2.1.10	2.9
Salmon feed putting pressure on wild stocks - is suply chain taken into account in the Ministers' decision?	Feed ingredients	2.1.10	2.9
The inshore waters of Cork and Kerry have been devastated by Pair Trawling targeting sprat as feedstock for the fishmeal plant in Killybegs, Donegal. It is reasonable to assume that MOWI's proposal to quadruple production will require four times as much fish feed.	Feed ingredients	2.1.10	2.9
It takes 5kg of wild fish to produce 1.1kg to 1.5kg of high protein fish pellet, which in turn produces 1kg of finished farmed salmon. One of the fish used as fin fish food is sprat. Sprat fishing is at present completely unregulated, using a 16 millimeter net to catch everything in almost every bay and inlet in Ireland.	Feed ingredients	2.1.10	2.9
Flesh dyed to make the salmon pink	Feed ingredients	2.1.10	2.9
Protein harvested from sea off Africa that is no longer available to feed the people in that region.	Feed ingredients	2.1.10	2.9
Soya grown on reclaimed land to make fish food.	Feed ingredients	2.1.10	2.9
Feed being eaten by wild fish destroying natural instinct to look for food	Feed ingredients	2.1.10	2.9
Farms introduce a non-natural food source in the wild due to overspill.	Feed ingredients	2.1.10	2.9

Automated intensive force feed farming system.	Feeding	2.1.10	2.9
High concentration of force fed salmon surrounded by clouds of sea lice	Feeding & lice	2.1.10/3.5.3	2.9/2.12.2
AGD potentially being passed to wild salmonids	Fish health & Welfare	2.1.13/3.5.4	2.12
Mortalities increasing with increase in sea level temperature	Fish health & Welfare	2.12.1	2.12
Annual mortality rates are in excess of 40%	Fish health & Welfare	2.12.1	2.12
It is dishonest that the mortality figures for salmon farms in Ireland do not include fish that have died from non-notifiable diseases such as Salmonid Rickettsial Septicaemia (SRS).	Fish health & Welfare	2.12.1	2.12
Animal welfare history of MOWI is sub-par (sea lice, open wounds, disease)	Fish health & Welfare	3.5.3	2.12
Salmon farming is cruel, unethical and barbaric	Fish health & Welfare	2.12.1	2.12
Fresh water extraction degrades the environment and residents drinking water	Freshwater use		
Locations for water abstraction associated with this licence application have been omitted	Freshwater use		
Impacts on wild salmon and sea trout	Impact on salmonids	2.3/3.5	6.5
Natura Impact Statement submitted is inadequate in that it relies on a narrow field of scientific data, such as Jackson et al	Inadequate EIAR		
Debris from fish farm are periodically found on local beaches - pens broken up in storms? This will become more frequent with climate change.	Litter	App. 2.4	App. 2.4
I am a very frequent visitor to the Derrynane area and have spent many hours in the winter months picking up litter from its beautiful beaches and much of what I find, particularly on the beach near Derrynane pier, is netting and other debris from the fish farm	Litter	App. 2.4	App. 2.4
Debris from the fish farm are periodically found on our local beaches and the last such incident at Derrynane, two years ago took us 6 days to clear, when a very large buoy, broke apart and sent hundreds of thousands of polystyrene beads into the water and across rocks and rock pools at Lambs head.	Litter	App. 2.4	App. 2.4
The micro plastics associated with the feeding routine are producing sick fish that are not fit for eating. The pollution from the feed itself and the copper materials will last for decades if not over a hundred years.	Micro plastics, Cu	2.1.10	2.9
The developer has carried out an Environmental Impact Assessment (EIA), a Natura Impact Statement (NIS), an Annex IV Risk Assessment, and a screening for an AA, however since the Minister's determination of November 2023 no AA has been carried out. The Annex IV Risk Assessment did not look at species such as the Otter (Lutra lutra) and the Harbour seal (Phoca vitulina) which are protected under the Habitats Directive for Kenmare River SAC (Special Area of Conservation)	No AA	2.2.7/3.5.1	
The Currane system and Kerry Blackwater are home to populations of otter and freshwater pearl mussels, both being protected as individual species and existing within a local network of sites covered by SACs. Anything that reduces the numbers of salmon and sea trout (such as this proposal) in the rivers will directly damage mussel populations, so is illegal within the Habitats Directive.	Otters & Pearl mussels	2.2.7/3.5.1	
Freshwater pearl mussels are in poor conservation status within the catchment and due to salmonids being a glochidial host within their life cycle the continued decline of seatrout populations due to the impact of salmon farming is most likely to affect their regeneration.	Pearl mussels	3.5.1	
Having an open pen salmon farm in such a rich marine biodiverse area, (SAC, NHA and more recently recognised globally for its contribution to international marine biodiversity with the Greater Skellig Coast Hope Spot designation) really goes against the Nature Restoration Law if we are already seeing detrimental effects to local fish populations and potential to	Pearl mussels	3.5.1	

impact the endangered Pearl Mussel which is found in the local salmon rivers.			
I will not allow my child to swim on certain day…….see the slice of faeces and food waste coming out of the cages, rife with parasites and disease	Pollution	2.1.11.4/ 2.1.1.2	8.2
Seen deterioration in Ballinakill Bay where the seashore is barren and salt water fish are all but gone	Pollution	2.1.11.4	8.2
Effluent discharge (Ecoli)	Pollution	2.1.11.4	8.2
Increased bacteria in fish farms	Pollution	2.1.11.4	8.2
No negative impact cannot be the case - plume of excreted material seen emanating from the pens as seen from Scariff Island in summer	Pollution	2.1.11.4	8.2
Feed and excrement cannot be contained in the open nets	Pollution	2.1.11.4	8.2
Ineffective use of wrasse to reduce sea lice	Sea lice	3.5.3	2.12.2
What method do Silver King Seafoods Limited/MOWI propose to use to control the lice on their salmon. Chemical or Cleaner fish or Hot water? All equally cruel.	Sea lice	3.5.3	2.12.2
Open-pen salmon farming produces vast numbers of sea lice, because of the warm and relatively static water movement, these parasites feed on the salmon in the pens.	Sea lice	3.5.3	2.12.2
Swimmer claims to have been "covered by sea lice all over my body whilst swimming in the area a few years ago. I believe the fish farm was the only obvious reason for this infestation…"	Sea lice	3.5.3	6.5.3
Number of lice not reflective of number of fish in pen	Sea lice	3.5.3	6.5.3
Lepeophtherius salmonis lice Protocol levels are arbitrary, have no direct association with potential lice level impacts on wild fish and are not related to the number of salmon on licensed sites. Potential impact of Caligus elongatus, a species which may also impact on salmon and sea trout smolts should be taken into account in the assessment of risk	Sea lice	3.5.3	2.12.2
Modelling shows no potential sea lice issue but serious impact on wild fish is already evident. Real world evidence is needed.	Sea lice	3.5.3	2.12.2
Our local Coastwatch group and other eNGOs in west Cork have highlighted their experience and of the Deenish salmon farm as one of repeat sea lice infestations and disease, a devastating loss of wild salmonids and damage to the tourist and angling business around Waterville.	Sea lice	3.5.3	2.12.2
Frequent and uncontrolled levels of sea lice during wild smolt migrations	Sea lice	3.5.3	2.12.2
Impacts of sea lice eggs/larvae being carried in currents not taken into consideration	Sea lice	3.5.3	2.12.2
Sea trout not taken into account in NIS	Sea trout		
Antibiotic overuse	Treatments	3.5.5/ App 3.1	2.12.1
Treatments with antibiotics and poisons	Treatments	2.1.13	6.5.5
The use of Nuvan and other pesticides at the fish farm sites create's living clouds of sea lice	Treatments	2.1.13	6.5.5
Information on types and quantities of chemicals used on fish farms to combat pests and diseases in Ireland, are held by the developers as they are commercially sensitive, how can a regulatory authority allow an industry to self-police itself in such a way	Treatments	2.1.13	6.5.5
Current research has, in addition, raised concerns regarding the dangers to human health from exposure to the large volumes of chemicals used by open-net farms in their efforts to control sea lice numbers and disease, and from the consumption of potentially contaminated farmed salmon produced under the present open-net system. It has been suggested that the chemicals used for lice and disease control in salmon, whilst in the nets, do not affect the fish. However evidence shows that a large proportion of harvested fish have suffered injury whilst in the nets, creating pathways for chemical compounds to ingress the bodies of the fish.	Treatments	2.1.13	6.5.5
Need for many chemicals to keep the fish alive	Treatments	2.1.13.2.1	6.5.5
Chemical treatment on an overwhelming scale	Treatments	2.1.13.2.1	6.5.5

High level of pesticide use	Treatments	2.1.13.2.1	6.5.5
Vast quantities of toxic compounds are tipped into the sea to try and control sea lice infestations in the farmed stock.	Treatments	2.1.13.2.1	6.5.5
MOWI in their native country Norway, would not be allowed produce farmed salmon for human consumption, in the way they do in Ireland. The Norwegian health authorities have established and enforce, extremely rigorous controls to ensure maximum fish welfare, minimum use of chemicals, and maximum food safety and fish quality standards. Regular sea-floor inspections are carried out to also ensure minimum disturbance of the sub-surface environment.	Welfare, food safety, quality standards	2.1.13	2.12
Arguments for and against but there is a need to adopt the Precautionary Principle to protect wild fish	Wild fish	3	6.5
Small wild fish entering the pens and being eaten	Wild fish	3	6.5
Impacts on Lough Currane and Waterville fishery	Wild fish		
Sea trout are listed in Ireland's biodiversity plan and the commitments in the national strategic plan for sustainable aquaculture development must include maintaining biodiversity with regard to sea trout populations.	Wild salmonids	3.5	
No mention of sea trout in fisheries section of EIAR.	Wild salmonids		
Excellent wild catch in the Currane system after Deenish had been closed for a few years (2006-2010?).	Wild salmonids		

4.1.1.1 Algal blooms

Point raised

There has been issues in recent years with algal blooms in the area of the site which most likely is related to nitrates emanating from the salmon farm.

Points addressed by the applicant

Phytoplankton bloom events occur from time to time in southwestern Irish bays and further afield. These result from the advection, into the bay, of off-shore phytoplankton populations fed from natural, nutrient upwelling events. As illustrated in the EIAR, current and foreseeable nutrient conditions around Deenish are neither at nor expected be at concentrations which would change the trophic state of the water body and promote localised algal blooms. Long term monitoring data of the existing farm at Deenish Island both by the developer and the EPA, illustrate that the nutrient status of these waters is well below the established Environmental Quality Standards (EQS) for marine waters.

MI - Further comments or requests

Harmful Algal Bloom (HAB) occurrence and abundance are naturally occurring events in Irish coastal waters, and occur in multiple locations (including locations where there is no aquaculture activity) at varying times of the year around the coastline. A recently published study investigated this topic area in Scottish coastal waters[197], concluded that there is a lack of a significant relationship between farmed salmon and harmful algal bloom abundance. The MI are unaware of any established proven and published data or references which link between increases in algal bloom occurrence which are directly correlated with nitrate concentrations resulting from aquaculture operations in Irish Coastal waters.

4.1.1.2 Benthic Impacts

Points addressed by the applicant

[197] Gianella F, Burrows MT, Davidson K. 2023. The relationship between salmon (Salmo salar) farming and cell abundance of harmful algal taxa. Harmful Algae, Vol 129. https://doi.org/10.1016/j.hal.2023.102512

As required by Benthic Monitoring Guidelines laid down by the DAFM (December 2008), annual benthic audits are undertaken at the Deenish site to monitor the benthic environment. The benthos at Deenish farm has been surveyed for 15 years with all reports submitted to the Department of Agriculture, Food and Marine. These audits show that the seabed at the stations located at the edge of the pens and beyond appear to be in good condition and showed no signs of impact from the adjacent finfish activities. The benthic community in the vicinity of the site can tolerate the proposed biomass and the farm operations as proposed together with the application of a fallow period at the end of each cycle, will not significantly affect benthic ecology.

Page 1, Bullets 2 – 8. These comments relate to the destruction of life on the seabed due to "toxic sludge on the seabed." Results of seabed surveys over a long time period of many years and at numerous sites around the Irish coast and specifically at Deenish Island clearly indicate that this is not the case with at least species of polychaete worms being recorded under the pens.

These AQUAFACT surveys include:

- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2023,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2022,
- Environmental Surveys beneath Finfish Pens at Deenish Aquaculture Site T6/202 Kenmare Bay, County Kerry 2021,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2020,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2019
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2018,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2017,
- Environmental Surveys beneath Finfish Pens at Deenish Aquaculture Site T6/202 Kenmare Bay, County Kerry 2016,
- Environmental Survey beneath Finfish Pens at Deenish Aquaculture Site (T6/202) Kenmare Bay, County Kerry 2015,
- Environmental Survey beneath Finfish pens at Deenish, Kenmare Bay 2014,
- Environmental Surveys beneath Finfish pens at Deenish and Inishfarnard, Kenmare Bay, County Kerry 2013,
- Environmental Surveys Beneath Finfish cages at Deenish and Inishfarnard, Kenmare Bay 2012,
- Environmental Surveys beneath Finfish cages at Deenish and Inishfarnard, Kenmare River, County Kerry 2011 and
- Environmental Survey of Silver King Seafoods Ltd. Aquaculture Site at Deenish Island, Kenmare River, County Kerry 2008).

At no stage throughout the years did the surveys provide evidence of azoic (no oxygen) conditions.

While the effects of organic enrichment was at times evident within the footprint of the pens and out to 10 metres, fauna was always present and there was no evidence of outgassing (methane production that occurs in azoic condition). Opportunistic species such as the polychaete worms *Capitella* spp. and *Malacoceros vulgaris* were frequently present in high numbers in this footprint and served to increase bioturbation and oxygenation of the sediment as they feed on the organic matter. Mobile epibenthic scavengers such as fish, starfish and crabs can also help in removing large amounts of organic matter and these were frequently evident within the footprint of the pens.

The Allowable Zone of Effect (AZE) under the benthic monitoring protocols is an area out to 30m from the surveyed pens. At the Deenish site impact was typically evident at the Under and edge pens surveyed and occasionally at the 10m stations. More commonly at the 10m and 20m stations, species that are very sensitive to organic enrichment e.g., the burrowing anemone *Cerianthus lloydii* and the brittle star *Amphipholis squamata* have been recorded.

The limited area impacted by the organic enrichment and is reflective of the dynamic nature of the site with mean ebb and flood currents of 0.1m/sec, whilst periods of peak currents of 0.25 – 0.35m/sec during the tidal cycle on both Springs and Neaps. This indicates the potential for rapid dispersal and dilution of settleable solids away from the site, even during still weather conditions.

The reference to the 15% threshold and overlay with disturbing activities is taken from NPWS guidance and is used extensively by the competent authority to assess screening for appropriate assessment. The Kenmare River SAC – Conservation objectives supporting document – Marine

habitats and species (NPWS, 2013) outlines the Department's view that "licensing of activities likely to cause continuous disturbance of each community type should not exceed an approximate area of 15%"

MI - Further comments or requests

This point is further addressed in Section 2.3.2 above.

The point regarding the 15% threshold is addressed in the AA report.

4.1.1.3 Cetaceans

Points addressed by the applicant

While 15 species of odontocetes (toothed whales and dolphins), including the Habitats Directive Annex II Species Bottle-nosed Dolphin (*Tursiops truncatus*) and Common Porpoise (*Phocoena phocoena*), and three species of *mysticetes* (baleen whales) have been recorded in Kenmare Bay, cetaceans rarely interact with marine farm sites and so disturbance and entanglement impact can be discounted.

Fixed equipment on site is confined to a generator on the feed barge. This is housed in a heavily insulated container below deck, which greatly limits noise transfer into the environment. Whilst noise can travel some distance over the sea surface in calm weather conditions, the noise profile of net pen farm operations is regular, low in register and is rapidly attenuated, thereby creating little disturbance. Thus, noise is not considered a significant feature of such an operation, or a likely or significant environmental risk.

In addition, the farm at Deenish operates under organic farming principles so does not employ the use of acoustic deterrent devices. There are no other significant sources of noise on site. Thus, the impact of noise and vibrations on cetaceans will be insignificant. As a result, no impact on cetacean species is expected.

MI - Further comments or requests

There are a number of marine mammals (dolphins, whales and porpoises) that intersect, in some way, with the Kenmare Bay SAC (identified from the National Biodiversity Data Centre Ireland, and the applicants NIS).

The main impacts associated with the proposed project on dolphins, whales and porpoises are related to:

- Noise disturbance - the increase in marine vessels resulting from the proposed project is considered minimal and would not be a significant increase, when compared to the existing movements in the area from fishing boats and recreational vessels. Noise associated with marine vessels is considered low. Noise from the pens during operation is considered to be not significant as the sound pressure would be low and with rapid attenuation. Acoustic Deterrent Devices to protect the stock form seals (which have a potential to disturb dolphins, whales and porpoises), have never been required at the licenced site, and the applicant states they are not likely to be required [these will be prohibited through licence conditions]. Predator control will be through sufficiently weighted and taut netting to prevent attacks.
- Collisions or entanglement - the small number of vessels that will be required will not significantly increase vessel traffic in the area. These vessels will be travelling at slow speeds, in a predefined trajectory, allowing for animals to predict movement of the vessels and avoid collisions. There have not been a significant number of studies undertaken on the interactions between dolphins, whales and porpoises and salmon farms. However, in Ireland reports of dolphins, whales and porpoises becoming entangled or trapped in salmon pens are extremely rare, and this is not expected to occur with moorings and netting which are appropriately tensioned and weighted, which is the case in this project.

- Obstruction and displacement – the potential for the infrastructure to cause obstruction to dolphins, whales and porpoises is considered low. These mobile species can avoid and go around any obstructions without any significant disturbance. The size of the project is relatively limited and not significant when considered against the overall area and is not likely to cause loss of habitat to these wide-ranging species.
- Attraction – some dolphins, whales or porpoises may be attracted to the farm sites as the infrastructure can act as artificial reefs and encourage fish aggregation. This would be limited to the direct vicinity of the site and would be considered small scale. Feed management and stock management will reduce the effect, minimising the potential attraction.
- Water quality – there is the potential deterioration in water quality due to build-up of waste feed or faeces, but the site is well flushed and exposed to waves and currents, so significant build-up is unlikely. Organic status ensures lower stocking density which helps avoids this. The use of veterinary products and chemical is possible. Concentration of these in the water or food chain are considered likely to be very low and well diluted.
- Commissioning and decommissioning - Most of the infrastructure will be assembled and disassembled on land and floated to and from the site. Activities will be short term and with low impact.

The potential for impact from the listed hazards is generally unlikely or of low intensity. While there may be some changes present in the environment, they are not likely to be significant, and impact on dolphins, whales and porpoises can be ruled out.

It is noted that the applicant confirms that, under organic principles, Acoustic Deterrent Devices (ADDs) will not be used at the site. As addressed in Section 2.3.3 – it is recommended to prohibit the use of ADDs at the site.

4.1.1.4 Cleaner fish Management

Points addressed by the applicant
The use of wild cleaner fish for sea lice control is still relevant in Ireland due to demand outweighing supply. It is the intention of MOWI in future to develop facilities that will allow for 100% use of hatchery reared cleaner fish. Wild fish are sustainably harvested by local fishermen when required. Further details on cleaner fish management can be found in the EIAR and NIS Appendix 3.3
MI - Further comments or requests
This section is addressed in Section 2.3.6 and throughout the document.

4.1.1.5 Escapes

Points addressed by the applicant
No farmed escapees have been reported in Deenish since MOWI began operating the site in 2008. MOWI have implemented a fish escape prevention policy for all farm sites. As well as being fully aware of the potential impact risks of escapees on local wild fisheries (subject to species in question and season), it is essential to the company's commercial viability to contain its fish for harvest. In respect of fish farm escapes, MOWI follows the guidelines on containment of farmed salmonids, drawn up between the North Atlantic Salmon Organisation (NASCO) and the International Salmon Farmers Association (ISFA) (NASCO, 2010). All floating pen equipment, nets and associated structures are specified to withstand local current and wave climate conditions. Mooring systems are designed to withstand predicted 50-year local wave climate conditions and thus to protect the integrity of the pens. Mooring grid components are inspected annually. Preventative strategies include operating procedures for the use of vessels

around pens and the provision of adequate navigational lighting and radar reflectors to prevent damage arising due to navigational errors by non-company vessels.

Comprehensive net management and maintenance plans and procedures are in place to include regular in-situ net inspections by divers and remote operated inspection vehicles in addition to full net strength testing, inspection, and repair after washing in a dedicated net management facility.

MI - Further comments or requests

This section is addressed in Section 2.3.5.2.4**.**

4.1.1.6 Fallowing

Points addressed by the applicant

As is required in all finfish farm licences, the Deenish farm always fallows after a crop has been harvested. The minimum fallow requirement is four weeks per production cycle. In practice the Deenish farm has been fallowed for a minimum period of 8 weeks to a maximum of 24 weeks, over the three most recent crop cycles

MI - Further comments or requests

This section is addressed in Section 2.3.5.

4.1.1.7 Fish Health & Welfare management

Points addressed by the applicant

The application of good husbandry and management practices, biosecurity standards and veterinary health plans, all under the supervision of our dedicated fish health team which includes a veterinary practitioner, contribute to the optimisation of fish welfare, their well-being and propensity to thrive. All our farms are certified to the highest possible standards, namely Global GAP, and EU Organic Aquaculture, which address fish welfare aspects related to feed, water quality, health management, transport and harvesting.

Smolt quality and effective vaccines are the cornerstones of our fish health management strategy.

We vaccinate 100% of our fish to reduce the risk of disease and compromised welfare, and we apply the utmost care to ensure the highest quality and robustness of our smolts, to reduce health risks.

Our procedures on plankton monitoring and mitigation practices, together with continuous training on plankton surveillance, risk management and response plans, contribute to reducing losses. We apply monitoring protocols adapted to seasonal risk, ensuring that surveillance is carried out on a frequent basis during high-risk periods. During harmful algal bloom events we follow a management and response plan to protect our fish and use measures such as aeration systems and cessation of surface feeding.

Promoting fish welfare, resilience and well-being remain integral in our feeding strategy and feed development. We have elevated the use of functional ingredients to support fish welfare when exposed to conditions that may compromise the skin and gills

MI - Further comments or requests

This section is addressed in Section 2.3.5.

4.1.1.8 Salmon Migration

Points addressed by the applicant

With regard to returning salmon, it is thought that the fish seek out the scent of their nascent rivers.In the Kenmare River area, the Coriolis effect will cause plumes from rivers that enter the bay to tryto flow in a northerly direction. The three rivers that enter via Ballinskelligs Bay (Emlaghmore, Inny and Currane/Waterville) will initially travel in an anticlockwise direction and then head northwards once past Bolus Head and thereby have no interaction with the site at Deenish. Plumes of rivers on the south shore of Kenmare Bay e.g., the Cloonee, will flow northwards across the bay and deflect westwards before turning to the northwest at Lamb's Head and thereby have no interaction with the Deenish site. The rivers that enter the bay on its north shore will flow westwards before also turning to the northwest at Lamb's Head and thereby have no interaction with the Deenish site.

Returning salmon will therefore not pass close to the Deenish site. Departing adult salmon and smolts are thought to follow the plumes of their nascent river and move out into deeper water off the coast as quickly as possible. For this reason, they will therefore not pass close to the Deenish site and even if they did, the likelihood of the fish interacting with larval lice is considered as being very low given the low densities of larvae in the water at distance from the fish farm.

Sea trout are considered to have relatively shorter migration patterns than salmon and are thought to stay close to the mouths of their nascent rivers, or typically inhabit the coastal environment during their marine phase.

MI - Further comments or requests

This topic is addressed in Section 2.2.5.

4.1.1.9 Impacts on Wild Salmonids

Points addressed by the applicant

As previously addressed.

MI - Further comments or requests

This topic is addressed in Section 2.3.5.2**.**

4.1.1.10 Sea lice

Points to be addressed

"I had the very unpleasant experience of being covered by sea lice all over my body whilst swimming in the area a few years ago. I believe the fish farm was the only obvious reason for this infestation in the area at that time. "

Points addressed by the applicant

-

MI - Further comments or requests

Sea lice, in the context of aquaculture, are a group of invertebrate ectoparasitic copepods, of the family Caligidae, found on fish world-wide[198]. They are not true lice, which would be insects. The context of being itchy or getting a rash while swimming, sometimes referred to as 'swimmer's itch' or 'sea lice' or other terms, is likely referring to larvae in the water that causes irritation, which may be as a result of a number or creatures, often jellyfish or anemones. There is no connection with the

[198] https://www.marine.ie/site-area/areas-activity/aquaculture/sea-lice/sea-lice

sea lice from a wild salmonid and aquaculture context - these caligid copepod 'sea lice' do not interact directly with humans in any way.

4.1.1.11 Sea lice levels

Points addressed by the applicant

Sea lice are a naturally occurring small ecto-parasitic copepod crustacean found on marine fish, including salmonids. Ovigerous female sea lice are those which produce the infective larvae and treatments are timed to remove adult females before they can release larvae. Setting the treatment trigger at 0.5 ovigerous L. salmonis per fish in spring ensures that treatments are carried out when a maximum of half of the fish examined have one ovigerous sea louse. This is a practical time to interrupt sea lice development. Later in the year, the development of new generations is not as synchronised and automatic intervention at a sea lice level of 0.5 ovigerous by way of treatment is not justified. A level of 2.0 ovigerous sea lice per fish has been shown to be a pragmatic level at which intervention by way of treatment is advisable.

Sea lice level of 2.0 ovigerous (0.5 ovigerous in Spring period) are used as Treatment Trigger Levels (TTL) to inform management to take action to reduce sea lice levels, as outlined in the Monitoring Protocol No.3 for Offshore Finfish Farms – Sea Lice Monitoring and Control, Department of Marine and Natural Resources (2000).

Monitoring Protocol No.3 for Offshore Finfish Farms – Sea Lice Monitoring and Control by the Department of Marine and Natural Resources. Treatment triggers during the spring period are set close to zero in the range of from 0.3 to 0.5 egg bearing females per fish and are also informed by the numbers of mobile lice on the fish. Where numbers of mobile lice are high, treatments aretriggered even in the absence of egg bearing females. Outside of the critical spring period, a level of 2.0 egg bearing lice acts as a trigger for treatments.

MOWI Ireland has developed a non-medicinal strategy to control sea lice using cleaner fish. This is the preferred strategy for managing sea lice infestations. Results to date illustrate that cleaner fish will maintain ovigerous lice levels on salmon in pens at or below 0.1 lice per fish. It also has the beneficial effect of radically reducing the use of chemical treatments and, therefore, treatment dispersal. Cleaner fish are species which display a natural behaviour of removing parasites and dead skin from other fish species in the wild. MOWI Ireland sources hatchery reared lumpfish from two hatcheries in Ireland and Wales in addition to hatchery reared wrasse supplemented with locally caught wrasse.

National Survey Of Sea Lice (*Lepeophtheirus salmonis* Krøyer and *Caligus elongatus* Nordmann) on Fish Farms in Ireland 2010 to 2022 – In the Southwest (all farms) there were no recorded instances of L. salmonis infestation levels greater than the treatment trigger level as shown in Figure 1 and Figure 2

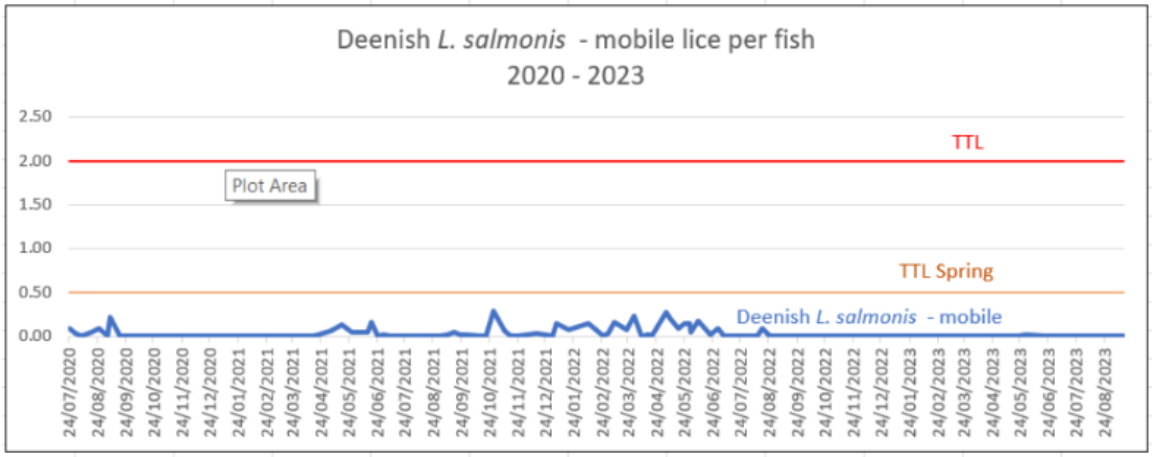

Figure 1: All mobile L. salmonis reported at Deenish 2020-2023 (blue). No data is available in Aquafarmer for mobile species prior to 2020. TTL Spring (orange) is the treatment trigger level set by the Marine Institute for the Spring period and TTL (red) is the treatment trigger level set for all other times. Note that in the sea lice monitoring protocol TTL thresholds apply to Adult ovigerous female L. salmonis, but at no time were the TTL levels breached even for all mobile sea lice and for most of this period the levels were significantly lower than the trigger levels.

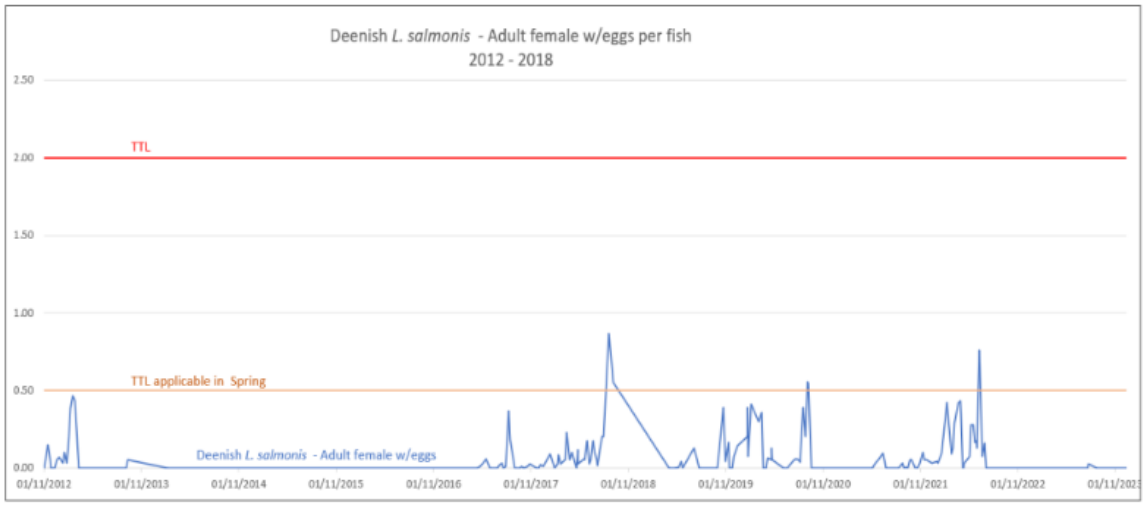

Figure 2: Adult ovigerous female L. salmonis reported at Deenish 2012-2023 (blue). TTL Spring (orange) is the treatment trigger level set by the Marine Institute for the Spring period and TTL (red) is the treatment trigger level set for all other times. Note that at no time were the TTL levels breached and for most of this period the levels were significantly lower than the trigger levels.

MI - Further comments or requests

This topic is addressed in Section 2.2.5.

4.1.1.12 Freshwater Pearl Mussel

Points addressed by the applicant

The freshwater pearl mussel (*Margaritifera margaritifera*) is a large filter feeding mollusc found in unpolluted freshwater rivers. The freshwater pearl mussel has a very unusual life cycle involving a larval stage (glochidia) which must attach to the gills of a host salmonid fish and stay encysted for approximately 9 months before dropping off and settling back on to the river bed. The juvenile mussels often stay buried in the river bed for a period of 5 years until they are large enough to withstand the currents of the river.

The populations of European pearl mussel have been in decline over the past century with populations declining by as much as 90%. In Ireland, 27 freshwater pearl mussel populations are protected withing 27 Special Areas of Conservation with eight of these populations representing 80% of the total population of Irish freshwater pearl mussels.

Threats to freshwater pearl mussels in Ireland include nutrient enrichment, acute pollution incidents, river bank erosion, forestry, land change, bog and arterial drainage and loss of salmonid stocks (Moorkens, 1999).

The main reason for the observed decline appears to be the low level of survival of juvenile mussels which are extremely sensitive to slight changes in environmental conditions.

For survival, juvenile mussels require clean, well oxygenated water with little silt, sediment, or algal growth.

According to the NPWS 'the decline of the freshwater pearl mussel has resulted from failure to recruit young mussels to populations. The cause of these recruitment failures is damage to the species' habitat, specifically through hydrological, sedimentation, other morphological and enrichment impacts.'

In Ireland, the dramatic decline in the number of highest quality river sites in recent years is likely to have been a major factor in the decline in freshwater pearl mussel populations. Just over 30 of these highest quality river sites remain having numbered in their hundreds in the 1980s and 1990s (EPA, 2021).

While the absence of a host salmonid species may also be a factor it does not appear to be as important as the environmental conditions of the river in which the juveniles are found. In an extensive study of 20 freshwater pearl mussel populations across Europe the link between juvenile mussels and the lack of a suitable host species was only rarely observed (Geist et al., 2006). Indeed, recruitment of juvenile mussels was higher in rivers with lower numbers and biomass of host salmonid species compared to rivers with higher numbers and biomass of host species where mussel recruitment was lower or absent. The explanation being that the higher densities of host fish in the non-recruiting streams was due to nutrient enrichment which was resulting in an adverse impact on pearl mussel recruitment.

It follows therefore that the priority for supporting the recovery of freshwater pearl mussel populations will be efforts to address water quality and hydromorphological impacts on rivers with resident populations.

MI - Further comments or requests

This topic is addressed further in Section 3.6.1.6 and in the Appropriate Assessment Report documents.

4.1.1.13 Treatments

Points addressed by the applicant

We use sound farming practices, proven policy principles and keep our fish in good conditions that satisfy their biological needs for food, clean water, space and habitat. Our fish health management focus is on disease prevention which includes vaccination and builds on control approaches, supervised by our fish health professionals. The use of therapeutics for the control of parasites and infections is strictly controlled by Organic standards. Only treatments approved by the Irish Health Products Regulatory Authority (HPRA) and organic regulations are permitted for use in organic farms. Treatments, if required, are always under veterinary supervision and must comply with

veterinary written directions, notification to the organic certification bodies as well as observing mandatory withdrawal periods.
MI - Further comments or requests
This topic is addressed in Section 2.3.5.2.3.

4.1.1.14 Freshwater use

Points addressed by the applicant
Periodically, MOWI Ireland bathe fish stocks in freshwater to repair gill damage caused by marine amoeba, phytoplankton, zooplankton, and jellyfish. To provide sufficient quantities of low salinity water for these baths, MOWI employs reverse osmosis filtration of seawater on its live fish wellboat carrier, MV Aqua Transporter.
MI - Further comments or requests
There will not be a requirement for water extraction from a freshwater source, therefore there will not be an impact on the environment from the extraction activity.

4.1.1.15 Stocking density

Points addressed by the applicant
All MOWI Ireland farms including Deenish are managed under organic principles as dictated by the requirements of EU Organic regulations 854/2004, 889/2008, 710/2009 and 848/2018. The maximum allowable stocking density in net pens is 10kg/m^3, which is at least half that allowed in conventional salmon rearing systems.
MI - Further comments or requests
Turnbull et al (2005)[199] examined stocking density ranges from 10 kg/m3 to 35 kg/m3 and found no negative effects on salmon up to an inflection point of 22 kg/m3, and no substantial effect below 32kg/m3. These findings were largely confirmed by Adams et al (2007)[200], and Oppedal et al (2011)[201]. Stien et al. (2013)[202] states that low stocking densities 9 < 22kg/m3) will give more natural behaviour (to congregate and freedom to move).

4.1.1.16 Fallowing

Points addressed by the applicant
As is required in all finfish farm licences, the Deenish farm always fallows after a crop has been harvested. The minimum fallow requirement is four weeks per production cycle. In practice the Deenish farm has been fallowed for a minimum period of 8 weeks to a maximum of 24 weeks, over the three most recent crop cycles
MI - Further comments or requests
This section is addressed in Section 3.6.1.1.

[199] Turnbull J, Bell A, Adams C, Bron J, Huntingford F (2005)Stocking density and welfare of cage farmed Atlantic sal-mon: application of multivariate analysis. Aquaculture 243:121–132

[200] Adams CE, Turnbull JF, Bell A, Bron JE, Huntingford FA(2007) Multiple determinants of welfare in farmed fish,stocking density, disturbance, and aggression in Atlantic sal-mon (Salmo salar). Canadian Journal of Fisheries and Aqua-tic Sciences 64: 336–344.

[201] Oppedal F, Dempster T, Stien LH (2011a) Environmental driv-ers of Atlantic salmon behaviour in sea-cages: a review.Aquaculture 311: 1–18

[202] Stien LH, Bracke MBM, Folkedal O, Nilsson J, Oppedal F, Torgersen T, Kittilsen S, Midtlyng PJ, Vindas MA, Øverli Ø & Kristiansen TS. 2013. Salmon Welfare Index Model (SWIM 1.0): A semantic model for overall welfare assessment of caged Atlantic salmon: Review of the selected welfare indicators and model presentation. Reviews in Aquaculture 5, 33–57.

4.1.1.17 Feed ingredients & Feeding

Points addressed by the applicant

The farm at Deenish is manged under organic farming principles which governs the choice of feed rations delivered to fish on site. All feed inputs are formulated to comply with EU Directives 834/2007/EC and 889/2008/EC as amended by 710/2009/EC and are certified to the organic standards set by a number of international organic certifiers e.g. Organic Food Federation (UK), Naturland (Germany) and Agriculture Biologique (France).

The feeds are composed mainly of fish meal and oil derived from the trimmings of fish caught for human consumption, organic vegetable oil, organic peans and beans, organic soya products, organic wheat, vitamins, and minerals in addition to naturally fermented sources of pigment are added to our organic salmon feeds.

In 2023, the forage fish dependency ratio (FFDR) for MOWI Ireland salmon was 0.34. Thus, for every one kg of fish produced by MOWI Ireland, 0.34kg of forage fish (meal) was fed. This ratio represents the quantity of wild-caught fish used to produce our organic feeds. It is calculated based on taking into account the FCR (Feed Conversion Ratio), the inclusion level of forage fish-derived marine ingredients in the feed (notably any marine ingredients produced from by-products are not included) and the yield ratio of producing marine ingredients from forage fisheries.

All ingredients, marine as well as non-marine in origin, which are used in the production of our feeds, are fully traceable. 100% of our soy originates from deforestation-free areas, is non GM (not genetically modified) and is Organic certified.

For more information go to https://MOWI.com/blog/MOWI-annual-report-2023/

Automated delivery of feed from the barge to the pens is controlled by site staff who monitor fish behaviour via underwater cameras. The fish cannot be force fed, as some comments suggested, and delivering feed to the pens when the fish are not going to eat would be a waste of resources for the company, hence the controls put in place to mitigate excess waste feed entering the environment.

MI - Further comments or requests

The MOWI *Policy on Sustainable Salmon* feed states that shall have a traceability system in place – which shall include volume per species, country of origin, and fishery. Marine raw materials shall not origin from IUU (Illegal, Unregulated and Unreported) catch or from fish species classified as endangered by the International Union for the Conservation of Nature (IUCN) red list. Marine raw materials processed from whole fish shall be sourced from suppliers who adhere to responsible fishery management practices. This entails sourcing fishmeal and oil from fisheries that are certified as sustainable according to the MSC standard and/or the IFFO RS scheme and/or achieve Fish Source scores ≥6 in all categories and ≥6 in the biomass category. Suppliers of feed raw materials shall comply with recognized crop moratoriums. Vegetable raw materials like, e.g., soya shall not originate from areas of deforestation. The producer shall also ensure legal use of land and water, and respect of the needs and rights of smallholders and indigenous people as well as protection of workers' health and rights. MOWI accepts this to be documented through soya certified under the Roundtable for Responsible Soy (RTRS), ProTerra or equivalent.

Their policy states that, as a minimum, feed suppliers should be GLOBAL G.A.P. certified by an accredited certification body.

4.1.1.18 Pollution

Points addressed by the applicant

The Environmental Impact Assessment report deals comprehensively with impacts from farm discharges. Discharges from the farm in its current form do not have a significant effect (positive or negative) on water quality. MOWI Ireland has submitted annual environmental monitoring reports since 2008 to the Department of Agriculture food and Marine, for both the benthos and the waters around the farm. These reports illustrate that the seabed at the stations located at the edge of the pens and beyond appear to be in good condition and showed no signs of impact from the adjacent finfish activities.

Discharges predicted from the proposed operations will not give rise to negative effects on water and it is concluded that there will no significant effects.

MI - Further comments or requests

This section is addressed in multiple other sections of this document.

4.1.1.19 Litter

Points addressed by the applicant

MOWI Ireland operates a comprehensive environmental management system which is certified to the ISO 14001 standard. Operational procedures are in place for the management of all waste streams arising from its farm operations, including Deenish. The potential risk of materials or waste entering the marine environment is low. However, occasionally after severe storms, some materials may blow from land bases off-shore. In this event, every effort is made by local staff to retrieve any loose materials. In addition, MOWI Ireland organise annual shore and beach cleans to retrieve all waste material. It is our experience that the waste collected is derived from sources other than fish farms, including domestic sources.

MI - Further comments or requests

MOWI s *Policy on plastic use and plastics waste management* states that they will focuses on avoiding unnecessary use of plastics in their operations, and makes sure plastic waste is handled in a responsible manner. This includes collection and disposal of waste according to legislative requirements, a code of conduct for suppliers, quarterly reporting, encouraging the use of recyclable materials and alternatives, and prevention of escape of litter into the environment.

Waste management is addressed further in Section 2.7.5.

4.1.1.20 Microplastics and Copper

Points addressed by the applicant

In a MOWI study, fillet, liver, gills, and the content in the gastrointestinal tract from farm-raised (MOWI North Atlantic salmon) and wild-caught salmon (caught on the Norwegian coast) were analysed.

The company found that there were no microplastics in their salmon fillets. The study also showed that the levels of contaminants in wild salmon is higher compared to farmed salmon, which is to be expected and related to differences in diet. https://www.salmonbusiness.com/MOWI-looks-formicroplastics-in-its-farmed-salmon

Organic farming regulations prohibits the use of copper antifoulants on net pens. The Deenish site has not had any net antifoulants for more than 14 years.

MI - Further comments or requests

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4.1.1.21 Sustainability

Points addressed by the applicant
MOWI Ireland is committed to the production of high quality organically certified Atlantic salmon products in harmony with the natural environment. We believe this to be an integral part of responsible, efficient, sustainable aquaculture and profitable business management. To this end MOWI Ireland is committed to producing salmon in harmony with its natural cycle and with respect for the natural resources on which we depend. Specifically, we will produce our salmon and products along the following principals. ▪ Respect for the needs of our animals and implement high welfare standards which is essential for fish health management. ▪ Conservation of natural resources. ▪ Promotion of renewable resources and minimization of the use of non-renewable resources in our production and processing systems. ▪ The use of natural processes and substances and mechanical methods in preference to chemically synthetic substances with minimal use of chemically synthesised substances and synthetic processes. ▪ Promote the reduction, reuse and recycling of wastes while avoiding pollution and waste ▪ No use of Genetically Modified Organisms (GMO's) in our products, feed, and processing aids, either directly or indirectly. ▪ At the very least, all organically reared and processed salmon produced by MOWI Ireland will comply with the requirements of the following Organic aquaculture production regulations and standards. • EU Organic regulations 854/2004, 889/2008, 710/2009 and 848/2018 • Bio-Suisse standard for Organic aquaculture & processing, • Naturland Standard for Organic Smolt & Salmon Production Third-party certification remains key to our sustainability strategy. 100% of harvested volumes in 2023 were sustainably certified by the Global Sustainable Seafood Initiative (GSSI)-recognised standard: ▪ GlobalG.A.P.
MI - Further comments or requests
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4.1.1.22 Climate change & Energy use

Points addressed by the applicant
MOWI has adopted a global approach to climate change which is aligned with climate science (our targets are approved by the Science Based Targets Initiative, SBTi) and the Paris Agreement to limit the increase in the global average temperature to 1.5°C above pre-industrial levels by the end of the century. MOWI has chosen to pursue the Representative Concentration Pathways (RCP) 2.6 pathways and the climate scenario that will limit the global average temperature to 1.5°C above pre-industrial levels. Our energy consumption and GHG emissions data are reported internally and audited by an independent third-party annually. We disclose our GHG emissions strategy and performance in

association with the Carbon Disclosure Project (CDP). MOWI has maintained its CDP climate rating at A- reflecting our continuous work on performance and transparency on climate-related metrics.

We are working in collaboration with our peers in the seafood sector and other ocean economies (High Level Panel for a sustainable ocean economy) and the UN Global Compact to optimise the value of the ocean to produce more sustainable food as a strategy against climate change, while at the same time increasing our understanding of the potential impact of climate change on our business. MOWI also collaborates with science to further advance our focus on circularity and climate change.

We also engage with public policy officials to discuss the topic of climate resilience in the seafood sector. Through the Federation of European Aquaculture Producers and national industry associations we engage with governments, public policy officials, scientists and NGOs towards sustainable seafood production, healthy ocean, sustainable finance (including green bonds and sustainability-linked finance) and ESG disclosure regulation and standards (such as GRI, TCFD and TNFD).

GHG emissions from Irish salmon aquaculture is relatively low when compared to other protein sources such as poultry, beef, or lamb. 3.88 CO2 eq./kg of organic farmed salmon compared to 11.75 kg CO2 eq./kg of cattle. (BIM, 2023). **https://bim.ie/wp-content/uploads/2023/02/BIMCarbon-footprint-report-of-the-Irish-Seafood-Sector-1.pdf**

MOWI is part of the advisory network of the High Level Panel for a sustainable ocean economy which comprises more than 135 private sector, non-governmental organisations, and intergovernmental organisations across 35 countries. As a member of the advisory network, we aim to share knowledge on existing initiatives and actions within ocean-farming that can contribute to the High Level Panel's aim of advancing a new relationship between humanity and the sea that protects the ocean and optimises its value to humankind. **https://www.oceanpanel.org/.** In addition, this network allows a discussion with public policy officials on topics such as climate change and ocean pollution.

The Blue Food Assessment, the High Level Panel for a Sustainable Ocean Economy, and FAO's Blue Transformation roadmap, continue to provide a credible and transparent assessment of the potential of aquaculture as a sustainable ocean economy. Blue foods have lower environmental footprints than land-based foods. Farmed salmon in particular has lower GHG emissions, water use and land use when compared with chicken. **https://MOWI.com/blog/blue-food-assessment-showsbenefits-of-salmon-farming/**

In response to a comment regarding fish farms requiring significant energy for water circulation and temperature control, open net pen marine fish farming sites, like Deenish, are located in areas where the water flow is sufficient to assimilate uneaten fish feed and fish faeces without significant effect on the environment and where water temperatures are suitable for the fish being reared.

Water circulation and water temperature control are not a requirement for rearing the fish at these sites, and hence they use much less energy than would be required for operating fully enclosed pens or terrestrial grower sites.

MI - Further comments or requests

This issue is addressed further in Section 2.5.

4.1.1.23 Regulation of sector

Points addressed by the applicant

Aquaculture in Ireland is licensed by The Minister for Agriculture, Food, and the Marine, (MAFM) under the Fisheries (Amendment) Act, 1997 and its associated Regulations which have been amended to give effect to various EU environment protection Directives.

All licenced sites are subject to annual audit by the licencing authority, in addition to sea lice and fish health inspections by the Marine Institute and food safety audits by the Sea Fisheries Protection Authority.

MOWI Ireland is also subject to audit under voluntary certification schemes as listed below.

- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2018
- The Irish Organic Association Organic Salmon Standard with reference to EU Organic regulations 889/2008, 710/2009 and 848/2018 for organic aquaculture production,
- Naturland Standard for Organic Processing,
- Bio-Suisse standard for Organic aquaculture & processing,
- Naturland Standard for Organic Smolt & Salmon Production,
- The Brand Reputation Compliance Global Standard for Food Safety
- Global Gap Integrated Farm Assurance Standard - Aquaculture base

A number of comments referred to the licence conditions relating to stocking, harvesting and biomass. This is the subject of an ongoing appeal being considered by the Aquaculture Licences Appeals Board. All relevant information can be publicly accessed via https://alab.ie/activeappeals/appealsyearsreceived/appealsreceivedin2019/ap12019/#d.en

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MI - Further comments or requests

The MI works closely with the Sea Fisheries Protection Authority, the Food Safety Authority of Ireland, and the Department of Agriculture, Food and the Marine, to monitor farmed finfish for certain veterinary drug residues and other substances to ensure conformance with the EU Residues Directive (96/23). The MI surveillance programme tests tissue for the presence of residues of certain authorised medicines which may be used, and also tests for the presence of treatments that should not be used in aquaculture, such as dyes and steroids, as well as contaminants such as heavy metals, PCBs and aflatoxins.

The MI provide scientific and technical advice to Department of Agriculture, Food & the Marine (DAFM) as part of the aquaculture licensing process, regarding compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 [the Birds and Habitats Directives (the 'Nature Directives') for protecting and managing Natura 2000 sites}, and the European Union (Environmental Impact Assessment) (Aquaculture) Regulations 2012 .

The MI are the Competent Authority for the implementation in Ireland of Regulation (EU) 2016/429, 'the Animal Health Law', as it relates to the health of aquaculture animals and the prevention and control of certain aquatic diseases [Issuing Fish Health Approvals (FHAs) for aquaculture establishments; Registration of specialist transporters of aquaculture animals; Assessment and management of imports, exports and internal movements of live aquatic animals; Co-ordination of the national fish health surveillance programme; and Risk-based surveillance of aquaculture establishments through a programme of inspections]. The Fish Health Unit is the National Reference Laboratory (NRL) for finfish, molluscs and crustacean diseases in Ireland, and implements a fish health monitoring programme to test for diseases listed under Commission Implementing Regulation (EU) 2018/1882, and Commission Implementing Decision (EU) 2021/260, as well as other aquatic diseases of national importance. Diseases that are not listed in Commission Implementing Regulation (EU) 2018/1882, or for which Ireland does not impose national measures under Commission Implementing Decision (EU) 2021/260, are controlled between the farmer and their private veterinary practitioner. Details of how these diseases are dealt with by industry are outlined

in the *Farmed Salmonid Health Handbook* and the *Code of Practice* which were both devised under the AQUAPLAN project.

The protocol for *Fallowing at Offshore Fin fish Farms* (2000) requires all finfish farms to undertake appropriate following which is a recognised technique for the control of disease and parasite problems.

The Marine Institute operates the National Sea Lice Monitoring Programme on behalf of the State since its inception in 1991, through the government's *Monitoring Protocol No. 3 for Offshore Finfish Farms* (2002) and *A strategy for improved pest control on Irish salmon farms* (2008), and facilitates the implementation the Single Bay Management process.

An annual benthic monitoring survey forms a part of *Monitoring Protocol No.1 for Offshore Finfish Farms Benthic Monitoring* 2008, conducted to ensure operations are not having an undue impact on the seafloor beneath fish farming pens.

Monitoring Protocol No. 2 for Offshore Finfish Farms Water Column Monitoring requires all finfish farms to carry out water column monitoring, according to the protocol.

The *Protocol for Structural Design of Marine Finfish Farms (2016)* sets out minimum standards for fish farm structural design.

4.1.1.24 Social Impact

Points addressed by the applicant
The current aquaculture operations at Deenish Island directly employs, from the local population, 7 full-time employees, in addition to 4 cleaner fish/fish health coordinators, 6 operations staff, 2 mechanical staff and 2 administrative staff all shared between four different sites in Kenmare and Bantry Bays, equating to 10.5 full time employees onsite. Contracting staff are also hired consisting of 4 part time engineering staff, 1 part time electrician, 4 divers and 1 truck driver. Staff will increase by a further 6 people during harvesting (3 full time crew assisted by 3 harvest crew). The presence of coastal communities within this region and aquaculture employment in the area illustrate the importance of the maritime industry in the region. Fish farming offers a means of maintaining a similar type of lifestyle as traditional fishing and has brought much needed year-round income to this part of rural Ireland. The importance of the industry to the local economy was highlighted during the Covid pandemic when tourism was shut down.
MI - Further comments or requests
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4.1.1.25 Tourism

Points addressed by the applicant
Recreational and tourism activities in the area currently take place in harmony with the existing aquaculture operation. The renewal application varies from the existing licence in that it requests a change to the boundaries of the existing site and to the operating conditions attached to the licence. If approved, the site boundaries will increase from 14.48ha to 33.48ha and operations will change from 10 pens to 15 pens. The increased site area will not prohibit or impact upon any existing recreational activity in the bay as only an additional 0.63ha of equipment will be visible at the surface. There is a minimum of 170m and 200m space between the respective northwest and southwest corners of the site pen grid and Deenish island for vessels to pass into the sheltered area west of the proposed site, ample room for local users. The additional pens only make a difference to the

northwest access by reducing the passage by 20m. Average annual vessel density for pleasure craft is only 2.67 hours per square metre, and even lower for sailing craft at 0.05 hours per sq. km
MI - Further comments or requests
This topic is addressed further in Section 2.7.4.

4.1.1.26 Bay obstruction

Points addressed by the applicant
The Deenish farm site is accessed primarily from Travara pier. Other piers that may be used include those located at Westcove, Derrynan, Ballycrovane and Castletownbere. As this is a licence renewal application, all aquaculture associated ship traffic makes up part of the existing shipping levels in the area. Shipping traffic associated with the Deenish site will not significantly change due to the renewal license and changing the site boundaries or operating conditions attached to the licence. There is a minimum of 170m and 200m space between the respective northwest and southwest corners of the site pen grid and Deenish island for vessels to pass. The additional pens only make a difference to the northwest access by reducing the passage by 20m, therefore the sheltered area west of the site will not be obstructed. It should be noted that the pens will be fitted with radar reflectors and navigational lights.
MI - Further comments or requests
This topic is further addressed in Section 2.7.

4.1.1.27 Visual Impact

Points addressed by the applicant
Unlike the siting of a new farm, Deenish fish rearing pens have been a normal part of the landscape in Kenmare Bay and the shore base a permanent and normal part of the shoreline since MOWI acquired the farm in 2008. Since first introduced into the bay in the 1980's, pen design and mooring arrangements have changed over the years and pens, top nets and ancillary equipment are now designed to have as minimal visual impact on the environment as possible. In terms of cumulative visual impact for Ballinskelligs Bay as a whole, the current and proposed Deenish site will not have a significant effect as the current site is visually limited to vantage points along the tip of Lambs head, and even so, the site is only fully distinguishable on a very clear day.Consequently, the cumulative visual impact of the development with other existing developments will be negligible
MI - Further comments or requests
This topic is further addressed in Section 2.9.

5 Conclusions

This report is to provide a reasoned conclusion of the competent authority (DAFM) on the significant effects on the environment of the proposed project, and to provide recommendations on avoidance and mitigation of any adverse effects. A review by the MI concluded that the EIAR and application documents submitted, along with this review document, constitutes an adequate basis for a reliable assessment by the Minister, and that the proposed project meets the requirements of the EU's Environmental Impact Assessment (EIA) Directive (2011/92/EU), as amended by Directive 2014/52/EU). The likely significant effects of the project have been identified and the supplied information facilitates a reasoned conclusion to be drawn, of these significant effects on the environment.

Considering the likely significant effects identified, and the measures envisaged (outlined below) to avoid, prevent, reduce, or offset significant adverse effects, it can be concluded that the proposed development is not likely to have significant adverse effects on the environment.

The proposed plan details a number of operational procedures and practices as part of the process of fish farming, which serve to reduce risk from potential hazards. These include:

- Continuous weekly in-house monitoring of sea lice levels, as well as coordinated treatments, to ensure control and management of sea lice numbers on the farm, for fish health reasons.
- Participation in the Single Bay Management process, with other producers in the bay, to manage the possibility of transmission of parasites between stocks and sites.
- The use of parasite control measure (cleaner fish, mechanical treatment, chemical treatment) to ensure control and management of sea lice numbers on the farm.
- The use of modern specification moorings, infrastructure and equipment to contain stock, which reduces the possibility of fish escapes, and reduces the potential for entanglement.
- The cleaning, checking and repair of nets to contain stock, which reduces the possibilities of fish escapes, and reduces the potential for entanglement.
- The use of bird nets on pens serve to protect the stock from bird damage, also serve to prevent birds from interacting with the fish and from becoming habituated to attempting to feed on the farm stock.
- Implement a fish health management plan and husbandry practises to prevent disease to protect stock, which reduces the possibility of the spread of diseases.

- Maintaining organic level stocking densities to facilitate fish welfare and growth and achieve industry standards, which reduces to potential hazards on the water and benthic environments.

These standard measures are part of the project design process and are not specifically mitigative measures but serve to reduce the risk from potential hazards, and their implementation by the operator would be considered important to the successful environmental performance of the project. While specific oversight of these measures would be impractical to implement, the Marine Institute considers these measures as examples of good practice at the farm level and recommend to the operator that all efforts should be made to implement them in their entirety. In order to effect these procedures and achieve these goals, among others, the licence conditions outlined below are proposed. Should the licence be granted, the Minister should ensure that these following measures are implemented to avoid, prevent, reduce, or offset significant impacts:

- Compliance with *Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring,* and on-going monitoring based on this Protocol, as well as the implementation of a Benthic Amelioration Plan if permitted parameters are breached, is recommended – with the aim to survey pressure on the communities and to assess potential impacts that could arise from the on-going operations at the site.
- The operators have procedures in place to ensure the responsible and efficient utilisation of feed products to minimise wastage and excess organic pressures on the external environment.
- Consenting should be based on the benthic audits demonstrating the capacity of the surrounding environment to absorb the pressure. If the site is unable to absorb the sustained pressures, as expressed through non-compliance with the parameters in the Protocol (*Monitoring Protocol No. 1 for Offshore Finfish Sites - Benthic Monitoring)*, then the production levels or processes should be reviewed - the actions and approach would be detailed through the BAP (benthic amelioration plan) process, as outlined in the Protocol.
- The use of Acoustic deterrent devices (ADDs) as a potential predator control measure be prohibited - due to potential impact on non-target species.
- Adherence to *Monitoring Protocol No. 3 for Offshore Finfish Farms – Sea Lice Monitoring and Control* is a requirement - to ensure control and management of sea lice numbers on the proposed farm.
- Adherence to the *Strategy for improved pest control on Irish salmon farms* as mandatory requirement.

- It is recommended that the following sea lice trigger levels be specified for this site:
    - An average for the site of 0.5 ovigerous *Lepeophtheirus salmonis* females per fish during the critical Spring period of March to May (inclusive).
    - An average for the site of 2.0 ovigerous *Lepeophtheirus salmonis* females per fish for the remainder of the year (June to February inclusive).
    - An average for the site of 10 total mobile *Lepeophtheirus salmonis* per fish, at all times - regardless of the number of ovigerous *Lepeophtheirus salmonis* per fish. Total mobiles consist of all pre-adult, adult male and adult female stages.
- Adherence to all relevant animal health regulations and application of Fish Health Authorisation should be a requirement.
- The use of veterinary medicinal products to treat or vaccinate aquaculture animals, should take place under veterinary supervision and in accordance with national and European legislation.
- The use of cleaner fish (Ballan wrasse (*Labrus bergylta*); Goldsinny wrasse (*Ctenolabrus rupestris*); Corkwing wrasse (*Symphodus melops*); Rock cook wrasse (*Centrolabrus exoletus*); Cuckoo wrasse (*Labrus mixtus*); and/orLumpfish (*Cyclopterus lumpus*)) as biological controls carries an inherent responsibility to ensure their health and welfare while on site, and they should be maintained on a supplementary maintenance diet, and their management should be sustainable and comply with all relevant guidelines concerning health and welfare.
- Every effort should be made to stock with cleaner fish of sustainable aquaculture origin, but where this is not possible, and their use is necessary for sea lice control, wild cleaner fish should be sustainably sourced.
- The licensee shall notify the Department of Agriculture, Food and the Marine, the Marine Institute and Inland Fisheries Ireland of a breach of containment immediately, and not more than 24 h, after becoming aware of the incident, and should keep records of the incident (fish number, type, origin, year-class).
- It is recommended that the operator report to the regulator any entanglement or mortality (as a result of the operation) of marine mega-fauna and birds - to better ascertain the threat from individual isolated events.
- It is recommended that net anti-fouling treatments not be used at this site.
- Ensure inputs of chemical substances to water, including discharges of treatments, do not lead to non-compliance with current EQS for substances listed in the schedule of SI 466 of 2008.

- The operator should pre-notify DAFM of discharges of chemotherapeutants from well boats providing evidence to demonstrate that EQS will not be breached.
- Ensure inputs of chemical substances to water, including discharges of treatments where relevant, do not lead to non-compliance with relevant EC and national EQS established for WFD priority substances and River Basin Specific Pollutants (SI 272 of 2009 as amended by SI 386 of 2015 and SI 77 of 2019). Note that Priority Substances and River Basin Specific Pollutant lists and EQS are reviewed and amended from time to time.
- Ensure nutrient inputs support achievement of regulatory water quality objectives as per surface water regulations and not lead to a deterioration of water quality status.
- The operator should report to the regulator the calculated annual inputs to the marine environment of Total Nitrogen and Total Phosphorus from fish farm activities at the licensed site.
- Ensure operations minimise discharges, emissions and losses of nutrients and potentially dangerous substances to the marine environment and mitigate the risk of impact on non-target species.
- The operation should comply with all relevant Irish and EU water quality regulations.
- The clause “That the applicant is required to secure Statutory Sanction from the Commissioners of Irish Lights for the aids to navigation for marking the structures as required by the Marine Survey Office.” should be included as a licence condition.
- The applicant should inform the UK Hydrographic Office of the development's geographical position in order to update nautical charts and other nautical publication.
- On-going cooperation with other bay users is advised, to ensure harmonious operations for all users.
- No waste material should be disposed of in to the marine environment and the operator should endeavour to minimise waste, and makes adequate provision for the removal and responsible, sustainable disposal of all waste, by authorised operators.
- The disposal of dead fish and waste organic produce should be in a responsible manner and by authorised operators.
- The storage of feed should be in a manner that is secure to prevent spillage and wastage.
- The storage of chemicals, veterinary medicinal products, and fuels should be in a manner that is secure to prevent release to the environment and improper use, and disposal is in a responsible manner.
- Adherence to the *Protocol for Fallowing at Offshore Finfish Farms* should be a mandatory requirement - to complement biosecurity on the proposed farm,

- Adherence with the *Protocol for Structural Design of Marine Finfish Farms* should be a mandatory requirement - in terms of preventing escape incidences from occurring,

A number of other MI reports have been produced supporting the decision making process of this application. They are:

- *Report supporting the Appropriate Assessment Screening of Intensive Aquaculture (T06/202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]*, dated Sept 2023.
- *RISK ASSESSMENT FOR ANNEX IV SPECIES Intensive Aquaculture Deenish, Kenmare Bay (T06/202),* dated September 2023.
- *Appropriate Assessment for Intensive Aquaculture (T06-202) in Kenmare River SAC [Site Code: 002158] and Deenish Island and Scariff Island SPA [Site Code 004175]* document, dated Jan 2026.

The findings and recommendations from these documents complement, and combine with, the findings from this report.