Mary O'Hara
Secretary to the Board
Aquaculture Licences Appeals Board
Kilminchy Court
Dublin Road
Portlaoise
Co. Laois.

20.11.2015

RINMORE

Re. AP2/1-5/2015 and AP2/7 – 14/2015
Site Ref: T5/555
Appeal against the decision by the Minister for Agriculture, food and the Marine to grant Aquaculture and Foreshore Licences to Bradan Fanad Teo. t/a Marine Harvest Ireland, Kindrum, Fanad, Letterkenny, Co. Donegal of site Ref: T05/555 for the cultivation of Atlantic Salmon; Salmo salar, on a site on the foreshore at Shot Head, Bantry Bay, Co. Cork.

Dear Ms O' Hara,

I wish to acknowledge the receipt of thirteen appeal submissions in relation to this licensing decision. We note that the Board wishes to consider these submissions as one appeal so, accordingly, we wish to make the following observations on the key issues outlined in the appeal submission.

The issues raised by appellants are broadly classified under the headings 1 to 9 below.

1. Public participation

A view is expressed that public consultation was inadequate. The timing and the processes required to engage public participation are set in statute and regulatory policy, as explained below.

1.1. Scoping

As far as is known, the scoping process for aquaculture in Ireland is not required by either the EU or any Irish aquaculture or environmental legislation. It is apparently a verbal policy, established by the then regulatory department, the DCMNR, in the early 1990's. The policy requires that a *scoping letter* is circulated, prior to the completion of an Environmental Impact Assessment and Statement (EIA and EIS) for a proposed finfish farm site, stating the reasons for the assessment, seeking suggestions as to its content and stating the intention to apply for a finfish Aquaculture Licence on foot of a successful EIA.

Further, the policy requires that the scoping letter is circulated to "all those who may feel that they may be affected by the proposal". Every endeavour was made to circulate all classes of individuals and organisations felt to fall into this category. The letter also included the full circulation address list and requested that those receiving the letter should circulate it further as they saw fit.

As the policy requires, both the address list and the draft scoping letter were submitted to the AFMD for approval prior to circulation.

1.2. Subsequent public participation

As pointed out in the scoping letter and in the EIS, scoping is only the first stage of an exhaustive and inclusive public and statutory consultation process, required by the Fisheries (Amendment) Act 1997 as amended and in SI 236 1998. This includes periods for public and statutory consultation following the publication of the application and the right to appeal and subject to deliberations by the Aquaculture Licence Appeals Board (ALAB) following the licence decision.

Unlike planning legislation, it is possible to join the consultation process for aquaculture licensing at any stage of the process, whether or not an interest in the application is lodged at the outset. In addition, the AFMD section of the Department of Agriculture, Food and the Marine issued a list of Statutory Consultees to Marine Harvest Ireland who were included in the consultation process and furnished with a full set of application documents including the EIS. The company engaged with those listed and beyond.

The application has been widely publicised, with advertisements in two local and one national newspaper and a number of articles in local newspapers and at least two national newspapers. In addition, all subsequent information sought by the AFMD section of the Dept. of Agriculture, Food and Marine has been published. All information and documents relating to this application were and still are available for public dissemination on the Marine Harvest Ireland website.

2. Hydrography; currents, waste transport and deposition

A number of appellants express dissatisfaction with the EIS submitted with the Shot Head application on various grounds. The most common of these claim inadequate consideration of hydrographic issues and the implications arising from the added loadings that would be created by a site at Shot Head. From MHI's perspective this topic covers:-

A. Currents and tides in Bantry Bay.
B. Wave climate.
C. Soluble wastes; production, dispersal and impacts; primarily nutrients dispersal.
D. Solids waste; production, deposition, dispersal and impacts; primarily salmon faeces.

MHI submits that to allege that these topics were inadequately covered in the EIS is an unreasonable criticism and suggests efforts to discredit the EIS, and therefore the application, as a whole. The Shot Head EIS and application was the first to be published for an Irish salmon farm proposal for about 9 years. The science of salmon farming and its environmental implications advanced considerably over this period. It is submitted that, as a result, the Shot Head EIS was far and away the most detailed, accurate and objective document of its type within the industry internationally, when published in June 2011.

In MHI's view, many of the criticisms and allegations made by appellants about potential impacts suggest that the EIS was either not fully read, not understood or that it was ignored as a source of information by many appellants.

Unlike some other Irish coastal bays and inlets, Bantry Bay is not a protected area (SAC / SPA). This was taken into account in the choice of box modelling to characterise the dispersion and dilution of solutes in the bay (EIS Section 4). These models used empirical (i.e. factual) tidal and current data, collected in Bantry Bay for MHI during the EIA / EIS process (see EIS Section 2.3) to derive the rate of dilution and dispersal of soluble wastes through the water column. This was done both for the Shot Head site alone and for all other sites in the bay in order to quantify any combined impacts that might arise, see EIS Sections 4.4 to 4.6. It is notable that no appellant criticised the use of box modelling or the specific results produced; the results were simply ignored.

The box models were supported by a large number tables and graphs in the EIS to clearly illustrate the seasonal nature of feeding, growth, harvesting of the site and waste production streams.

For the deposition and fate of settleable solids (primarily faeces, which are organic and readily biodegradable; see EIS, Section 4.8), international engineering consultants RPS were commissioned by MHI to produce dispersional models. These were fully calibrated against the same empirical hydrographic data that were used for the box modelling exercises.

All the models produced were based on defined worst case scenarios, comprising still weather (rather than wind-induced) currents, and peak feeding and stocking levels , when waste production peaks at maximum standing stock in March / April in Year 2 of the projected production cycle. To further the worst case approach taken, no allowances were made for biological decomposition or assimilation of wastes by bacteria, plankton or fauna, either in the water column or on, or in, the seabed. Thus it is felt that the calculated outcomes were detailed, safe, objective and had a considerable, built-in margin for error.

Wherever possible, the EIS adopted the internationally accepted EQO / EQS (Environmental Quality Objective / Environmental Quality Standards) approach in order to provide a fully objective assessment of whether or not impacts were sustainable in terms of the carrying capacity of the bay. The results showed unequivocally that impacts were well within acceptable limits, and that the proposed operation would therefore be fully sustainable, within the existing environment of Bantry Bay.

Concerns raised by correspondents' comments during the consultative phases of the Shot Head licence application process prompted MHI to commission additional model development from its consultants, Watermark and RPS. This work confirms the findings of the Shot Head EIS. The study employs the latest hydrodynamic and water quality modelling techniques which have been developed to their current level of sophistication for aquaculture applications since the publication of the Shot Head EIS. The final report for the study has just been issued and is appended to this response for the consideration of ALAB. The primary purpose of the study is to provide unambiguous and objective evidence of outcomes, in an attempt to avoid the need to use of terms such as "risk of", "possibility" and "likelihood" in the wording of the final outcome of the licence decision.

MHI submits that, if the EIS prepared for Shot Head had revealed sound reasons why the proposal should not go ahead, then the application would not have been submitted. Clearly, this was not the case.

On hydrography and the production and dispersal of wastes from the proposed site, the findings of the new report can be summarised as follows:-

A. Currents and tides in the bay:

The new RPS hydrodynamic model for Bantry Bay, commissioned by MHI, was driven by the RPS Irish Sea Tidal Surge Model, itself calibrated against a range of European and global bathymetric and tidal data sources. 15 different sets of local (SW Ireland) hydrographic data were used to verify the tidal flow (current) patterns simulated by the model. The model confirms the relatively weak tidal flow in many parts of the bay and an overall counter-clockwise circulation that was questioned by one appellant. The model also confirms the importance of residual currents in the dispersion of wastes in the bay, as well as the tendency for soluble wastes (from all sources) to pass west along the northern shore and to swing south of Bear Island to reach the Atlantic circulation. Thus wastes are diluted and moved out of the bay by tidal action and do not accumulate or concentrate in any part of the bay, in particular at its head, as alleged by some appellants. It is perfectly obvious that, had solids waste such as raw sewage (from Bantry, Glengarriff and Castletownbere) and catchment run-off been able to accumulate at the head of Bantry Bay due to centuries of tidal action, the inner bay at least would no longer exist.

B. Wave climate.

MHI commissioned RPS to carry out a Wave Climate Analysis for Bantry Bay and the Shot Head site; (EIS Section 2.4.) The analysis shows that the severest storms that penetrate the eastern end of the bay arise during Atlantic storms approaching from between 210° (SSW) and 270° (W), peaking at 240°. Outside this sector, storm force is considerably reduced by the protecting topography of the Sheep's Head and Beara peninsulae and Bear Island. Since the publication of the Shot Head EIS, a table of the wave climate at existing and potential salmon farm sites around Ireland has been compiled and is reproduced in Figure 1. This shows that, whilst the proposed sites may be exposed to severe storms of a 1-in-50-year return period, there are licensed sites in Ireland that operate in worse wave climates than indicated for Shot Head. Section 5.4 below refers to Appellants' concerns regarding salmon escapes. Accurate Wave Climate Analysis enables farm installations to be specified to endure the storm conditions that analysis suggests they may have to face. In any event, MHI will not be allowed to install the site unless the structural design and specifications have been independently certified by experts approved by the Department of Agriculture, Food and Marine.

C. Soluble wastes; production, dispersal and impacts - primarily nutrients dispersal.

Despite the unambiguous findings of the EIS, a number of appellants allege that waste accumulation will be the "final straw" in the "demise" of Bantry Bay if a further salmon farm is established. Again, using the internationally recognised EQO / EQS approach, the new RPS Bantry Bay Water Quality Model supports and confirms the detailed findings of the EIS in this regard. The study examines the fate of the nutrients Nitrogen (N), Phosphorus (P) and of the Biological Oxydation Demand (BOD) of the wastes that the EIS calculates will be discharged from the proposed Shot Head site. These are three standard parameters for the assessment of the environmental impacts of all biodegradable wastes and are calculated by means well established within the industry and further afield.

The RPS model predicts that, even including a 4-stage compounded worst case expectation, the operation of the Shot Head site will cause no significant elevation of N concentrations in Bantry Bay and ambient N levels will remain well below the established EQS for N of 168µg/l. In the case of Phosphorus, the model equally confirms the finding of the EIS that dissolved P discharged from the operation will not elevate ambient P to an extent where the established EQS of 119µg/l will be even be approached.

Concerns by some appellant s that such soluble waste products will exacerbate toxic plankton blooms are completely unfounded, by the very definition of the EQS principle. Phytoplankton blooms, like other such water-borne hazards, will however continue to develop offshore and be driven inshore by prevailing climatic conditions, as they always have.

Finally the study confirms that the BOD of discharges from the site will have no material impact on dissolved oxygen saturation within the bay or further afield.

The RPS report also examines the dispersal, dilution and degradation of standard medications that are likely to be used at the site. Usage is controlled by EQS's, which apply to the dispersion of the medications from the site in the water column, post treatment. In this case the EQS levels are standards required by law in SI 466 of 2008, the European Communities (Control of Dangerous Substances in Aquaculture) Regulations 2008. Thus the control of the use of each medication is unambiguous in its objective to protect the environment. The study finds that used at the appropriate dosages, the stated EQS's are not breached. Once again the report demonstrates objectively that, if the relevant legislation is adhered to, there will be no environmental impacts from these treatments and that the fears expressed by some appellants are unfounded.

D. Solid waste; production, deposition, dispersal and impacts - primarily salmon faeces

RPS was commissioned to estimate solid waste impacts from the Shot head site in 2011. This study is reincorporated as Section 5.5 of the new RPS report herewith.

Even under the theoretical worst-case conditions applied, the maximum predicted solids settlement after one year (when constant state would be reached) was just 12-13mm (0.5 inch) under each pen, tailing off to less than 1mm within 100m of the site. However, the EIS points out that, shallow as this layer is predicted to be it would never reach this depth in reality, because the worst case feeding conditions modelled would never be maintained for more than a few months.

It should also be emphasised that fish faeces and food remnants readily break down in an oxygenated marine environment and are fully biodegradable and assimilated under these conditions. This is an on-going dynamic process which, in the anticipated aerobic environment on the seabed under and close to the pens, will lead to the turnover of settleable solids into progressively finer particles and ultimately into fine suspended solids and solutes which will disperse in the water column by the routes described above.

Figure 1.

Comparison of wave climate parameters at Irish salmon farm sites where data is available.

Notes.
1. Data for sites 8 and 12 from old wave ray analysis method (1999); require revison.
2. Sites 1 and 2 never licensed; too exposed; Site 3 licensed but then rescinded; too exposed.
3. Sites 5 and 7 licence applications in process. All other sites currently licensed.

Exposure order	Site	Location	Frequency years	Storm direction°	Significant wave height H0 m	Wave period Tm sec	Most exposed end of site
1	Doonbeg Bear Island	Outer Bantry Bay	1:50	210°	13.90	15.45	E
			1:1		9.40	13.20	
2	Tralong	South coast	1:50	210°	9.04	12.44	S
			1:1		6.06	10.70	
3	Binnaweel-more	Lough Swilly	1:50	345	7.10	9.08	N
			1:1		4.53	10.96	
4	Smolt site Clare Island	Outer Clew Bay	1:50	285°	6.18	14.20	W
			1:1	270°	4.46	12.17	
5	Shot Head	Bantry Bay	1:50	240°	4.86	15.82	E
			1:1		3.29	12.84	
6	Portlea site Clare Island	Outer Clew Bay	1:50	285°	4.41	14.33	E
			1:1		2.96	12.04	
7	Kidney Rock	Kenmare Bay	1:50	255°	4.12	14.29	W
			1:1		3.25	12.82	
8	Deenish Island	Kenmare Bay	1:50	248°	3.90	15.20	E
			1:1		3.10	15.20	
9	Doonagh Point	Kenmare Bay	1:50	255°	3.79	14.15	W
			1:1		3.05	12.73	
10	Roancarrig	Bantry Bay	1:50	210°	2.80	12.00	E
			1:1		2.00	10.50	
11	Dooanmore	Lough Swilly	1:50	15°	2.86	9.19	N
			1:1		2.22	8.16	
12	Inishfarnard	Kenmare Bay	1:50	280°	2.20	15.20	W
			1:1		1.70	15.20	
13	Anny Point	Lough Swilly	1:50	345°	1.83	10.33	N
			1:1		1.46	8.67	
14	Waterfall	Bantry Bay	1:50	90°	1.00	-	E
			1:1		<1.00	-	

3. Impact on seal populations:

Few grey seal (*Halychoerus grypus*) inhabit the inner bay, preferring more exposed habitats further west. However Inner Bantry Bay is one of Ireland's main haul-out areas for harbour (common) seal (*Phoca vitulina*). This species comes ashore at haul-out sites to give birth in June and to moult during July and August. Many of the haul-out sites in Bantry Bay are in or adjacent to Glengarriff Harbour, within SAC 000090, which lists the harbour seal as an Annex II Habitats Directive species. There is a further cluster of haul outs at the western end of Whiddy Island.

The closest haul-outs are approximately 5km from the proposed Shot Head site area and there is a limited likelihood that seals will visit the site. It will therefore be necessary to assess whether or not anti-predator nets or even acoustic deterrent devices will be needed to protect the stock from seal attack early in the development of the site, if the licence is granted.

In 2010, the National Parks and Wildlife Service carried out a national harbour seal pilot monitoring project which included Bantry Bay[1]. This survey noted the principal reasons for harbour seal haul out site disturbance in Bantry Bay were due to leisure/recreation and fishing activity. Salmon aquaculture is not cited as a source of disturbance in spite of this activity being carried out in the bay for over 35 years.

The impact of the proposed development on wildlife including benthic fauna and flora were fully assessed in the EIS; these were quantified in Section 2.10 (benthos), and Section 5.5, to include mitigation and conservation measures.

4. Nutritional Quality and Food Safety

Allegations that consumption of farmed salmon produced by MHI is unsafe or nutritionally inferior to eat is patently untrue. MHI farmed salmon provides all the nutritional benefits of fish, with a higher proportion of protein to fat and a healthier balance of EPA and DHA fatty acids than red and white meat.

The Marine Institute, in conjunction with the Sea Fisheries Protection Authority and the Food Safety Authority of Ireland monitor levels of chemical substances in Marine Harvest fish annually. This underpins the quality and safety of the salmon produced by the company. MHI fish are monitored for the presence of residues of prohibited substances, veterinary drugs, pesticides, heavy metals, dyes and other contaminants. Farmed salmon is subjected to the same range of residue tests as all foods of animal origin. A Residue Testing Plan is developed each year in accordance with EU Council Directive 96/23/EC. This directive specifies the substances and groups of residues to be monitored in aquaculture. No non-compliant samples have been identified in farmed finfish in Ireland since 2005.

The National Food Residue Database (NFRD) is a comprehensive database for chemical residues and contaminants in food in Ireland. This database is available to public access through the interactive website http://nfrd.teagasc.ie. In addition, residue data specific to aquaculture may be found on the Marine Institute website www.marine.ie.

Further allegations that the farmed salmon produced by MHI are fed with diets which contain genetically modified organisms (GMO) are completely unfounded. MHI have never fed GMO ingredients in its history. All of our salmon production is organically certified to EU standards[2] which prohibits the use of GMO ingredients in salmon diets.

[1] National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, HARBOUR SEAL PILOT MONITORING PROJECT, 2010. Published June 2011

[2] • EU Organic regulations 834/2007, 889/2008 and 710/2009

5. Impact on Wild salmonids

Concerns are expressed by a number of appellants regarding possible impacts of the proposed Shot Head site on the health and conservation of local wild salmonid stocks. Specific concerns allude to disease, sea lice and farmed salmon escapes. Respondents refer to concerns for the main salmonid rivers in Bantry Bay and to the demise of salmon stocks due to the introduction of drift netting in the 1970's.

Drift netting was banned in Ireland from the end of the 2006 season but, as the EIS points out, concerns over the health of Irish salmonid stocks were reported at least as far back as the 1935 Report of the Commission on Inland Fisheries. The 1975 report of the Commission made specific reference to Bantry Bay rivers:-,

"There has been a decline in the salmon component of runs since the late 1930's, when spring fish accounted by weight for more than half our exports... This decline was gradual at first but rapid from the mid-sixties..."

"....the number of spawning redds in the Coomhola, Owvane and Mealagh rivers (Bantry Bay) had dropped from 99 in 1971 / 72 to only 6 in 1972 / 73. Electro-fishing surveys in 1973-1975 yielded no salmon and almost no fry in Bantry Bay Rivers."

Salmon farming cannot have been responsible for these findings. Since that time, over 40 factors that contribute to wild salmonid declines have been put forward and present concerns are focussed on marine survival.

MHI acknowledges that, where a salmon farm site has an extremely close hydrographic relationship with a river estuary, the risks of interactions between farmed stock and wild stock increase on a number of counts. However, with a very small[j1] and decreasing number of exceptions, modern Irish salmon farms are situated sufficiently far downstream of river estuaries that opportunities for interactions are radically reduced. This is far from the case in some other countries. In MHI's case, risks are further reduced by control measures which have been developed by the company, in cooperation with state agencies, to minimise on-farm occurrence of disease, sea lice infestation and breaches of net pen integrity.

It is of note that salmon have been farmed on a continuous basis on some sites in Bantry Bay for over 35 years. It is noted that two of the appellants provide theoretical graphs suggesting extinction curves, projecting the demise of wild salmonids due to sea lice in salmon farming bays within 12 to 25 years. Yet other appellants cite a recovery of wild salmon in Bantry Bay since the drift net ban (despite the presence of salmon farms). It is difficult to see how these views can be reconciled. MHI prefers to stand over its own objective assessment that, in the case of Bantry Bay, sea lice have limited capacity to reach farm sites from rivers and no ability to reach rivers from farm sites due to the specific hydrography of the bay and the location of the salmon farms within it. This state of affairs is made clear by the new RPS model and by MHI's experience of farming in the bay. See also Section 5.2.

5.1. Wild salmonids and disease

Concerns are expressed over the potential for the spread of disease from the proposed Shot Head site. As a generalisation, farmed fish are affected by a small range of "domestic" diseases, much as other domesticated livestock. Some of these diseases are indigenous to local wild fish species, including wild salmonids, from which such infections generally originate. The most common of these are treated prophylactically on farmed stocks, using vaccines.

Marine Harvest Ireland has sustained a healthy and profitable salmon farming business in Ireland ever since 1979. The continued health and welfare of the MHI's fish stocks is the key to the company's success. Stock health management is dealt with comprehensively in Section 3.4.9 of the EIS.

MHI manages its own breeding and smolt production programme in order to provide a source of high quality, non GM, disease- and parasite-free juvenile fish for stocking in all sea farm units owned by the Company. MHI hatcheries must be certified as free of a range of specific diseases, in EU approved health zones. Due to the high quality and health status of MHI ova (eggs) and juvenile salmon, surplus stock is sold at a premium to other farmers, both within and outside of Ireland.

The company has implemented a comprehensive Fish Health Management Plan under veterinary supervision. This plan is regularly reviewed and updated as required with full submission of updated plans to the Marine Institute who are the competent authority for fish health in Ireland. The plan underpins the obligations of Marine Harvest Ireland under the following EU and national legislation:-

- Directive 2006/88/EC and SI No. 261 of 2008 (Fish Health legislation)
- Directive 2001/82/EC and SI 144 of 2007 (Animal Remedies Regulations)
- Directive 1774/02/EC and SI 248 of 2003 (Animal By-Products Regulations)

The goals of the MHI Fish Health Management Plan are as follows:

- To prevent and control fish diseases and ensure the maintenance of a high level of fish health and welfare.
- To minimise environmental impact.
- To rear salmon in accordance with industry guidelines and the current best practices of the industry.

MHI's goals are achieved through the following actions:-

- Monitoring of fish health and welfare
- Monitoring of fish performance
- Defined stocking, on growing and fish handling procedures
- Predator control
- Strict biosecurity procedures
- Sea lice management
- Optimisation of feed quality and feeding techniques

Fish health issues should they occur are reported promptly to the Marine Institute which is the competent authority for fish health in Ireland.

As explained in Section 3.4.10 in the EIS, MHI Roancarrig is certified for organic production[3] as will Shot Head, if licensed. Disease occurrence is often preceded by stock stress, caused, for example, by overcrowding, high temperature / low oxygen, poor nutrition or stock predation. Modern farming techniques reduces or eliminates such stressors which have led in turn to a radical reduction in disease outbreaks and a consequent fall in treatment frequency on salmon farms.

[3] As noted in the EIS the MHI Roancarrig site is a certified organic salmon farm as are MHI's Kenmare Bay sites. Shot Head will also be a certified organic operation, if licensed.

5.2. Wild salmonids and sea lice

Impacts from salmon farm origin sea lice[4] are a concern for a number of appellants. As pointed out in the EIS, the salmon louse, *Lepeophtheirus salmonis*, has evolved a specialised life cycle over millions of years which enables it to parasitize wild salmonids very efficiently. Wild smolts are at their densest in the lower reaches of rivers, prior to migration. It comes as no surprise therefore that wild infestive copepodid[5] stages of *Lepeophtheirus* congregate at critical densities in the same locations to achieve efficient infestation.

The precise mechanism by which this occurs is still unclear but it is evident that mature female lice are able to hatch their eggs in these areas, having presumably been carried there at some point on homing adult fish. Salmon farms are a very recent introduction on this evolutionary timescale and this should be taken into account when considering the origin of infestive lice stages in all infestation events.

It is also a matter of fact that settled juvenile stages of lice on host fish have only been widely recognised and counted on salmon and trout for use as an indicator of lice infestation for the last 30 years or so, more or less coincident with the development of salmon farming. Thus, when stock levels reduced or even collapsed prior to this (a not uncommon feature of salmonid population dynamics, for example on the Waterville, where both rod caught and commercial sea trout and salmon catches plunged in the late 19th and early 20th centuries), it was not possible to ascertain the role of lice. However, natural, wild lice infestation pressure on wild fish can vary widely from year to year, due, for example to water temperature and drought. Thus in some years, natural lice infestations on wild fish can be very heavy, and in other years they can be negligible.

The only thing that can be said for certain is that, since salmon farming was introduced, in all cases, the first infestations of newly transferred farmed smolts onto farms in "virgin" or fallowed bays can only come from lice originating on wild fish. However to take the example of Shot Head and the Bantry Bay rivers, the proposed site is sufficiently downstream from the rivers at the head of the bay that, although wild origin copepodids can drift downstream into the Shot Head area, copepodids from a site at Shot Head will be unable to reach the estuaries, because they cannot drift upstream, against the residual current. The only exception in this case is the Adrigole River, which is downstream from Shot Head in the residual current.

There is both modelled and empirical evidence of what happens to *Lepeophtheirus* copepodid stages when released from a salmon farm site:-

- Very extensive plankton netting in Killary harbour, reported to the Sea Trout Working Group in the early nineties, indicated that copepodid numbers were as low as one copepodid per m^3 of water within 200m of an infested salmon farm site.
- Modelling of juvenile lice releases from farm sites in Lough Swilly has shown similar or greater magnitudes of dilution / dispersion of copepodids, as well as demonstrating that the number of copepodids that are capable of drifting into the vicinity of any river estuary in the lough would be considerably less than one copepodid per m^3 of water[6].

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[4] Note again that sea lice cause infestation by the settlement on host fish of infectious copepodid stages, which drift in the current for about 10 days, until they die after using up their yolk sac. They have no external mouth parts so cannot feed.

[5] Copepodids are the infestive larvae of *Lepeophtheirus.* They are planktonic and therefore drift in the current. The live on their internal yolk reserves and cannot feed otherwise because they lack external mouthparts. They have a lifespan of about 10 to 14 days in which to find a host, before their yolk reserves are exhausted and they die.

[6] Water quality modelling Lough Swilly; addendum report Lice dispersion; RPS Document no. IBE0078/NS/R01 (IBE0078/NS/XL01); BIM 2007.

It is submitted that, in neither case does this offer any great chance of drifting copepods finding their target hosts in sufficient numbers (if any) to cause what might be termed an infestation.

These findings support the view that, if farm sites are removed sufficiently far from river estuaries hydrographically, then copepodids of farm origin can have no material impact on levels of lice infestation on smolt emerging from their natal estuaries.

Naturally, whatever the risk of impact, it will be lessened by proactive and effective lice control by the farm operator. This is the strategy adopted by MHI on all its farm sites. See Figure 89 in the EIS.

On page 238 the EIS notes that, following the closure of the driftnet fishery at the end of 2006, only the River Meelagh and the River Coomhola were considered to exceed their conservation limits and were opened for angling from 2007 whilst the Glengarriff, Adrigole and Owvane Rivers were closed. However all three rivers were opened for catch and release angling from 2011. The River Owvane became the third river in the bay to be completely opened, in 2012

It would appear that, whilst the driftnet fishery may have continued to impact on stock health in Bantry Bay until its closure, the operation of three salmon farm sites in the bay has not impeded the progressive opening of rivers to angling since. This is good news indeed.

The main objective of the National Lice Treatment Strategy, fully adopted by MHI, is the maintenance of ovigerous female lice numbers below set threshold levels. This is achieved through weekly in-house examinations of fish at each site, conducted from spring through to the early winter months. A minimum of 25 fish per site are examined and all lice stages counted and recorded per pen (minimum of five fish per pen and five pens per site). It is the aim of the company to have no gravid female lice and this, coupled with a robust fallowing strategy, lice bioassay monitoring and rotation of medicines ensures good lice control. This is facilitated by the following means:-

- Fallowing between stocks.
- Single year class separation.
- Proper management of fish densities.
- Clean nets for water circulation. Lice counts are lower when nets are clean.
- Routine removal of moribund fish.
- Routine removal of mortalities.
- Coordinated and synchronous lice treatments.
- Stress reduction, as stress significantly increases susceptibility to lice.

Further, sea lice levels on all marine farms are monitored independently by the Marine Institute (MI), which is charged with carrying out regular sea lice inspections around the country in accordance with the DAFM Framework on Aquaculture Monitoring[7].

All fish farms undergo MI lice inspections 14 times each year. One lice inspection takes place each month at each site where fish are present, with two inspections taking place each month during the spring period-March, April and May. Only one inspection occurs for December / January. At each inspection, two samples of thirty fish are taken for each generation of fish on the site.

[7] Monitoring Protocol No.3 for Offshore Finfish Farms; Sea lice monitoring and controls

http://www.agriculture.gov.ie/fisheries/aquaculturefores horemanagement/monitoringprotocols/

Sampling is divided into three (3) regions, the west (Counties Mayo and Galway), the north-west (Co. Donegal) and the south-west (Counties Cork and Kerry). The results are published annually and are available to download from the Marine Institute library[8].

As part of the recent RPS hydrodynamic and water quality modelling study, RPS and Watermark were commissioned by MHI to examine the whole area of the two-way relationship between the infestation of farmed and wild salmonid stocks by lice, principally the salmon louse *Lepeophtheirus salmonis*. The techniques employed have been developed by these parties over the last eight years or so with specific reference to MHI marine farm sites. Early work was the subject of a paper given at the World Aquaculture Society Conference in 2007[9]. The findings of the new RPS Bantry Bay study are summarised below.

a) Potential for lice copepodid (infestive stage) production and dispersal from Shot Head and other Bantry Bay farm sites and the potential for impacts on other farmed and wild salmonid stocks.

The RPS water quality model was utilised to disperse defined numbers of copepodid (infestive) lice stages from the proposed Shot Head site, and from all sites in Bantry Bay, in the tidal currents. Copepodid larvae metamorphose from non-infestive Nauplius larvae 4 days post-hatch and then have a maximum lifespan of 10 days in which to find and attach to new salmonid hosts, before they die, on expiry of their yolk reserves. The model was adjusted to take account of these characteristics. In addition, the number of copepodids dispersing was adjusted to reflect two trigger levels, of larval hatches from an average of 1 ovigerous (egg-bearing) female louse per farmed salmon or from an average of 0.3 ovigerous louse per farmed salmon on the farm site. The model then dispersed the larvae, using an extinction curve, used by other prominent workers in the field[10] to reflect the natural attrition and death of the larvae after 10 days. The resulting model outputs show concentrations of larvae in the water column within Bantry Bay from which their chances of infesting wild salmonids can be estimated. Larval concentrations were examined both in open waters, where the possibility of encountering migrating wild fish can be considered, and also in river mouths where, in early spring at least, concentrations of wild salmonid smolt can enter the sea in such numbers that the chances of lice larvae encountering hosts may be increased, this also being the natural mechanism for wild lice infestation of wild hosts.

Even at the highest densities indicated by the model, which occur close to their farm site sources, of about 0.2 copepodids/m^3, rapidly dropping to less than .01 copepodids/m^3, the chances of open sea encounters with migrating wild salmonids are regarded as vanishingly small. The model was further interrogated by investigating the densities of larvae that could reach target receptor points in the estuaries of 13 rivers around the bay (including the Dromogowlane River, frequently mentioned as omitted from the EIS by appellants). The model finds that hydrographic conditions and larval longevity conspire to obviate any chance of infestation of emerging wild smolt by farmed origin lice in any part of Bantry Bay.

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8 www.marine.ie

9 Bass N., Shannon N. 2007. Modelling the dispersal of salmon lice (*Lepeophtheirus salmonis*) from proposed salmon farm sites in Lough Swilly, County Donegal, Ireland. World Aquaculture Conference, 2007, Sea Lice Session, San Antonio, Texas, March, 2007.

10 Amundrud, T. L. & Murray, A. G. 2009 Modelling sea lice dispersion under varying environmental forcing in a Scottish sea loch. J. Fish Dis. 32, 27–44. (doi:10.1111/ j.1365-2761.2008.00980.x)

The model was also used to examine the effects of wind-forcing in driving farm-origin copepodids inshore, into concentrations in or near river mouths where wild fish may congregate, a means of infestation expounded in particular by Costello[11] . However the model finds that in the conditions of Bantry Bay, wind forcing could not create this phenomenon.

The study concludes that, in the hydrographic conditions in Bantry Bay, densities of farm origin copepodid larvae are insufficient to represent any infestation risk to wild salmonids at any time or at any location in the bay.

MHI submits that, whilst it stands by the findings of the Shot Head EIS and the RPS report, the chances of infestation of wild salmonid stocks by farm-origin lice are infinitesimally small in the estuaries and open waters of Bantry Bay.

b) Potential for lice copepodid (infestive stage) dispersal from wild stocks in Bantry Bay and potential for impacts on farmed stocks.

The model further examined the dispersal of wild origin copepodids which have failed to find wild salmonid hosts in the spring susceptible period, when migrating from their natal rivers. This was achieved by releasing an artificial, constant flux of lice from river mouths around the bay. The model finds that, in all cases, whilst there may be some short-lived elevation of larval concentrations in the inshore margin, in the slipstream of the river outflow, this quickly dissipates with dispersion into the open waters of the bay. As a result, no concentrated plumes of wild copepodids are capable of reaching any farm site. Nonetheless, because of the large cross-sectional area that the farm pens present to approaching tidal water and the stocking density of the salmon contained in them, extremely low densities of drifting copepodids are still a likely source of infestation for farmed stock and experience with operating farm sites across Ireland suggests that this is the case.

It will be equally possible for very small numbers of planktonic larval lice (or detached adult lice), originating from inward migrating wild salmonids, to drift into salmon farm sites in tidal currents, with the same results. Again seasonal experience at farm sites tends to confirm this.

Thus, in the case of Bantry Bay, the model shows that, hydrography and copepodid longevity conspire to maintain copepodid concentrations of considerably less than 0.1 louse/m^3 over the bay area as a whole, for the most part. Whilst this may raise the possibility of gradual infestation of farmed salmon, it offers little chance of pathogenic levels of infestation of migrating wild fish, either in river mouths or in open wasters

The modelled finding that dispersed farm-origin copepodid concentrations are extremely low in Bantry Bay, whatever their source, is borne out in practice, in that, on-farm lice concentrations are generally very low, as evidenced by the government's lice monitoring program results for Bantry Bay.

[11] Costello MJ 2006. Ecology of se lice parasitic on famred and wild fish. Trends in Parasitology, 22, 10, 475-481.

MHI submits that in all its outputs, there are simple arithmetic truths in the findings of the Bantry Bay water quality model. To take the case of lice dispersal and infestation potential, a simple figure for copepodid numbers for dispersal is easy to derive from the numbers of ovigerous female lice that actually occur in practice. The copepodid numbers thus calculated are dispersed using a globally accepted modelling technique calibrated for its accuracy against vast quantities of empirical data to project copepodid concentrations at river mouths and throughout the bay. The consequences of their presence for both wild and farmed stocks can then be predicted. These truths can only be rejected if fault can be found with any part of the modelling process. If no fault can be found, then the unequivocal results of the model offer no grounds for objection by appellants or for a refusal of the Shot Head licence.

Again it is emphasised that the findings of this modelling exercise apply only to Bantry Bay and cannot be expected to apply elsewhere. It is necessary that conditions in each bay, its salmon farm locations and rivers, must be modelled in isolation of all other results and considered on their merits.

5.3. Use of Sea lice medication and management of resistance

Amongst concerns expressed over sea lice are some regarding sea lice medication, were the specific concerns expressed are related to the use of toxic chemicals and the development of sea lice resistance to these chemicals. As explained in the EIS, the risk of sea lice resistance to specific treatments is minimised by timely, fully effective, licenced and appropriate treatments, with treatment rotation. In addition, a limited number of fully licenced treatments are only permitted for use in salmon aquaculture. Further restrictions for the use of such treatments are dictated by EU Organic farming rules, which will be practiced at the Shot Head site.

In addition, sea lice medication is only licenced for use following extensive eco-toxicological studies which includes impact on crustaceans.

5.4. Escapes

There have been no escapes of MHI stocks since it commenced its operations in Bantry Bay. Reference has been made by some correspondents to the winter storms of 2013/2014 and the loss of fish from another farm in Bantry Bay. It should be noted that this loss was not from a MHI sea site and that all MHI farms in both Bantry and Kenmare Bays did not suffer any fish losses during this stormy period. [j2] Marine Harvest Ireland has invested heavily in the most up to date net pen and mooring technology in addition to the implementation of fish escape mitigation policies and procedures for the installation and operation of all its fish farms along with comprehensive inspection and monitoring procedures for operating farms. All farms are subject to independent audit by Engineers from the Department of Food and the Marine under Monitoring Protocol No. 4 for Offshore Finfish Farms – audit of Operations.

6. Visual impact / tourism

One of the reasons for the selection of the Shot Head site was that it is regarded as having the lowest visual impact of any aquaculture installation in Bantry Bay and, for that matter, further afield. This is because of its position, below the shielding topography of the northern shore in its vicinity and its distance from the southern shore of Bantry Bay. The one clear view of the proposed site, from a single house and road spur below the hamlet of Roosk will be at a distance of 700m. The materials selected for the site installations are, by and large dark and are expected to merge into the surrounding seascape. Apart from navigational lights, the site will not be lit at night.

Because of its hidden location, it is submitted that the presence of the site will have no impact whatever on terrestrial tourism in and around Beara. Whilst it will be visible to passing sea traffic, including tourist vessels, such views will be at an extremely low subtended angle and, as the EIS submits, will not impact on views across the bay as much as some other commercial activities in the near vicinity.

7. Impact on Calcified Sea weeds

In responding to this concern, voiced by one appellant, MHI submits that all the hydrographic, wastes and dispersional modelling carried out as part of this application strongly indicates that no water column parameter will be significantly affected, either by the operation of the Shot Head site alone, or in combination with other sites in the bay. Consequently, the existing environmental and chemical equilibrium of the Bay is fully expected to be maintained. For this reason, no impact on calcified seaweeds in the bay is expected to arise.

8. Navigation & Safety:

The leading Irish maritime consultancy Maritime Management was commissioned by Marine Harvest Ireland to offer expert opinion on the effect a finfish farm at Shot Head would have on the navigation of surface vessels in Bantry Bay, in response to public and statutory observations. It is the professional opinion of Maritime Management that the proposed site of the finfish farm at Shot Head will not cause a significant danger or hazard to navigation in Bantry Bay. A full copy of this opinion was submitted in 2012 in response to previous public submissions on the Shot Head Aquaculture licence application and accompanying EIS.

9. Noise

Noise is referred to briefly in the EIS is Section 5.3.5 of the EIS on page 250 in reference to possible noise impacts on marine mammals. The main noise outputs at the site arise from the generators and feeding equipment on the feed barge. However these are heavily insulated to effectively eliminate noise impacts at any distance for the source.

The only noises arising from the net pen installation are expected to be from feed spreaders at the water surface and vessel engines. Both these sources will be considerably attenuated within a short distance from the site. It is not likely that any noise from the site will be heard in the vicinity of the nearest habitation, at Roosk, a minimum distance of 700m from the site.

10. MHI is Unfit to hold an aquaculture licence

Marine Harvest Ireland was established in Co. Donegal (originally as Fanad Fisheries) in 1979 with farms in Mulroy Bay and Lough Swilly. Since then the company has grown to include farms in Clew Bay, Kenmare Bay and Bantry Bay and is now one of the leading organic salmon farming companies in the world.

Throughout its 36 year history, MHI has obtained numerous awards and achievements, most of which are subject rigorous audit and inspection.

In March of 2015, MHI attained Aquaculture Stewardship Council (ASC) salmon standard certification for its site at Deenish Island in Ballinskelligs Bay, Co Kerry which is the first ASC salmon standard held in Ireland. This standard is one of the highest international environmental and social sustainability standards in the fish farming sector. A further two salmon sites in Bantry and Kenmare Bays are undergoing assessment at present and it is our intention to have all of our farms certified to the ASC standard by 2020. This will include the Shot Head site.

ASC is an independent, international non-profit organisation that has developed a certification programme for responsible aquaculture which covers the following seven principles:-

1. *Legal compliance (obeying the law, the legal right to be there)*
2. *Preservation of the natural environment and biodiversity*
3. *Preservation of water resources*
4. *Preservation of diversity of species and wild populations (e.g., preventing escapes which could pose a threat to wild fish)*
5. *Responsible use of animal feed and other resources*
6. *Animal health (no unnecessary use of antibiotics and chemicals)*
7. *Social responsibility (e.g. no child labour, health and safety of workers, freedom of assembly, community relations).*

In addition to voluntary standards, the company is subject to regulatory audit by the following agencies;

- AFMD section of the Department of Agriculture, Food and Marine
- ERAD (Veterinary Medicines) Section of the Department of Agriculture, Food and Marine.
- Sea Fisheries Protection Authority
- Marine Institute
- Donegal Co. Council
- National Employment Rights Agency
- European Commission Directorate-General for Health and Consumer
- Revenue – Tax and Customs

In addition, Marine Harvest Ireland holds many voluntary Quality, Environmental, Organic and Health and Safety standards to include the following;

- ISO 9001 – Quality Management Systems
- ISO 14001 – Environmental Management systems
- OHSAS 18001 – Health and Safety Management Systems
- BRC Grade A – Food safety standard
- CQS Organic Salmon Standard
- Naturland Organic salmon standard
- BioSuisse Organic salmon standard
- Global GAP Aquaculture standard
- ASC standard for Deenish sea site in Kenmare Bay
- Bord Bia Origin Green Sustainability programme

A summary of awards and achievements during its history is included here. Thus it is submitted that MHI is “a fit person” to be granted this licence application and the many other licences it currently holds.

Marine Harvest Ireland – Awards & Achievements

2015: Maritime Industry awards; Excellence in Aquaculture award.
2015: ASC Salmon standard certification for Deenish Sea site, Ballinskelligs Bay, Co. Kerry.
2014: Verified Member of Bord Bia Origin Green Sustainability programme for food and drink producers.
2013: Irish Food Quality awards 2013; Fresh Fish category.
2012: Bord Bia National Organic awards 2012; Most Highly Commended Fresh Seafood Product.
2011: Marine Harvest Ireland Laboratory is awarded accreditation to ISO/IEC 17025 by the Irish National Accreditation Board.
2011: Bord Bia National Organic awards 2011; Best Fresh Organic Seafood award
2011: South West Sea sites (Inishfarnard, Roancarrig & Deenish) awarded OHSAS 18001 (Safety) certification
2010: Irish Exporters Association's Seafood Exporter of the year award
2010: South West Sea sites (Inishfarnard, Roancarrig & Deenish) awarded ISO 9001 (Quality) and ISO 14001 (Environmental) certification
2010: All freshwater and marine farms awarded GlobalGap certification for aquaculture
2009: Irish Food Writers Guild (IFWG) Award of Excellence for Clare Island Organic Salmon
2008: First Irish producer to achieve BIM Irish Quality Salmon Eco Standard.
2008: Clare Island Sea Farms awarded ISO 9001 and ISO14001
2006: AB (France) Organic certification for Clare Island and Rinmore Processing plant
2006: BRC Certification (Grade A) for food processing at Rinmore Processing plant
2005: Winner of EIQA/Safe Food National Quality & Excellence Award for Food Processing
2004: IBEC Environmental Awards 2003/2004. Managing for Sustainable Development Award – Judges Commendation.
2003: BIM EcoPact award. First Irish Aquaculture operation to achieve this.
2003: Excellence Through People training award. First Irish aquaculture operation to achieve this.
2003: Excellence Ireland Triple Hygiene Award.
2003: North West Region Award winner for Occupational Health & Safety – NISO Occupational Safety Awards
2002-2005: Irish Organic Farmers & Growers Organic certification for Rinmore Processing plant.
2002-2005: Naturland Organic certification for Rinmore Processing plant.
2001-2005: BRC Higher level certification for Rinmore Processing Plant
2001: International environmental standard – ISO 14001:1996.First primary food Producer in Ireland to obtain this.
2000: Irish Quality Salmon Standard for all freshwater production, marine production and processing operations.
1999: OHSAS 18001 certification of safety management system. First Irish Company in any sector to achieve this.
1994: IQA National Hygiene Award. Winner of the Fish Processing Category.
1994: North West Region Winner, NISO National Safety Awards.
1992: ISO 9002 - International Quality Systems Standard. First Fish farm in the world to achieve this.
1990: Irish Quality Association Q-Mark. First Aquaculture operation in Ireland to achieve this
1990 - 2004: Excellence Ireland Hygiene Certificate

Please contact me if you have any additional queries.

With regards,

Catherine McManus
TECHNICAL MANAGER