An Taisce
The National Trust for Ireland

Independent Review of Aquaculture Licensing
C/O Deirdre Morgan – Secretary to the Independent Review Group
Department of Agriculture, Food and the Marine
National Seafood Centre
Clonakilty, Co. Cork
P85 TX47

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To Whom it May Concern: An Taisce wish to make the following submission as part of the Independent Aquaculture Licensing Review - Public Consultation 2017

An Taisce welcome the opportunity to take part in this public consultation and the following outlines concerns and observations in relation to aquaculture licensing.
An Taisce supports the sustainable and balanced development of aquaculture, Licenses should be granted on the basis that they do not cause degradation in the area of the aquaculture facility or adverse impacts to local habitats, flora, fauna, and avifauna, (for example through habitat destruction, by way of habitat alteration, or by degrading water quality).

An Taisce acknowledges that a number of developments have taken place in the last number of years in order to reduce the ecological footprint of aquaculture and welcomes the introduction of licensing conditions to mitigate a number of negative impacts associated with aquaculture activities. Nevertheless, An Taisce would like to reiterate the need to ensure that future licensing and policies continue to reflect mitigation of negative effects, (such as the accumulation of waste, changes in macrofauna benthic communities alteration of the nutrient balance reduction in gene pool strength due to escaping aquaculture stock mating with wild populations, and transmission of diseases to wild stocks).

With regard to sustainability, as mentioned in Foodwise 2025[1], "a significant increase in food production cannot be considered in isolation from its environmental impact, in particular regarding concerns associated with the depletion of natural resources and the potential impact on climate change". Further licensing must continue to bear these factors in mind and mitigate negative unsustainable impacts.

Some key considerations

Precautionary principle

In the present context, the precautionary principle is particularly relevant with regard to the lack of scientific certainty, in some cases, regarding the cumulative impacts of aquaculture. Aquaculture projects should not be permitted unless adverse impacts of the project, in combination with other activities in the area, can be excluded. The onus should be on

[1] https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/report/FoodWise2025.pdf

aquaculture developers to demonstrate beyond reasonable scientific doubt that there will not be such adverse impacts.

Ecosystem-based management

Aquaculture activities should be considered at an ecosystem level. “An ecosystem approach for aquaculture (EAA) is a strategy for the integration of the activity within the wider ecosystem in such a way that it promotes sustainable development, equity, and resilience of interlinked social and ecological systems.” An ecosystem-based approach should ensure that the methods used to assess and manage marine living resources are geared towards maintaining and monitoring biodiversity, productivity, and the physical and chemical properties of an ecosystem. Better integration of marine planning and development management into other sectoral policy areas including terrestrial spatial planning, river basin management, biodiversity protection and heritage conservation is needed, such as whole bay management plans. The licensing process must show cognisance of this.

Cumulative impacts and carrying capacity

The aquaculture within an area should not exceed the carrying capacity of that area, i.e. what it can naturally sustain and assimilate to ensure no environmental degradation. Aquaculture operations should therefore be appropriately sited to ensure minimal impacts. It is therefore important to avoid the granting and operating of licenses in large numbers in one particular area, preventing not only detrimental impacts on the area, (including those on recreational industries such as angling and ecotourism), but also over-stocking within the industry itself. Environmental Impact Assessments (EIA) should be carried out to assess the in combination effects of all aquaculture activities within each bay, rather than assessing licences on an individual basis, in isolation from other impacts. Annex III of EIA Directive 2011/92/EU refers to the characteristics of projects that must be considered for an EIA. Paragraph 1(b) of Annex III refers to the cumulation with other projects, indicating that cumulative impacts of aquaculture operations are an important factor for EIA purposes. EIAs should also take into account the potential impact of the aquaculture facility over its entire lifecycle, including the construction, operation and decommissioning phases of the facility. In addition, in areas where there are a significant number of activities and anthropogenic demands and influences on a coastal zone, a Strategic Environmental Assessment should also be carried out.

Considerations under the Habitats and Birds Directives

In addition to the need to consider any potential impacts of aquaculture on Special Conservation Areas (SACs) under the Habitats Directive and Special Protected Areas (SACs) under the Birds Directive, the aquaculture licensing process and subsequent monitoring processes should take account of the continuing legal obligation to avoid, in such sites, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant. Further, in respect of species listed on Annex IV to the Habitats Directive - including otters and cetaceans, for example – it is prohibited, without a licence, to (amongst other things): deliberately capture or kill any specimen of these species; deliberately disturb these species, particularly during the period of breeding, rearing, hibernation and migration; or damage or destroy a breeding site or resting place of these animals.

Invasive species

Examples of alien species, which have been transported into Ireland, most likely by aquaculture and which have had a negative impact on the marine environment include the invasive seaweed Sargassum muticum and the parasitic protist Bonamia ostreae, which devastated native oyster populations in the 1970s. Aquaculture should not put the environment at risk from invasive species, instead native species cultivation should take precedence, particularly in the case of the Gigas (Pacific) oyster (Crassostrea gigas), discussed in further detail below.

Shellfish aquaculture

Some practices within shellfish farming have a negative impact and further intensification of production may lead to an increase in impacts such as the loss of feeding areas for birds, disturbances caused by increased human activity and other detrimental effects.

Mussels

Nutrient Enrichment

The possible effects of mussel excretions namely the change in the composition of the seabed (to anoxic hydrogen sulphide rich mud) and resulting changes to species composition must be further mitigated against. Mitigation measures already introduced are a welcome development, but these issues should continue to be thoroughly examined during impact assessment processes and reflected in the licensing process.

Oysters

Invasive species

Examples of alien species, which have been transported into Ireland, most likely by aquaculture, which have had a negative impact on the marine environment include the invasive seaweed Sargassum muticum and the parasitic protist Bonamia ostreae, which devastated native oyster populations in the 1970s. The Pacific oyster was originally thought to be of no threat to European wildlife as it was believed it would not spawn in our cold waters but as the water temperature has increase and the Gigas oyster has acclimatised resulting in self-sustaining feral populations.[2] Studies have shown it to be established as an invasive alien species in Lough Swilly, Lough Foyle and Strangford Lough. This also has the potential to threaten other native organisms within the area and change the ecosystems. The introduction of the use of (sterile) triploid stock, now reportedly used in the majority of Pacific Oyster aquaculture in Ireland may alleviate some concerns associated with the invasiveness of the species. Questions and concerns such as possible increased susceptibility to disease and chance of disease transmission among different stocks should also be addressed.[3] With regard to disease control measures which have been put in place, it must be ensured that they adequately address the issue and are fully implemented.

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[2] Dubsky – coastwatch website – "Help Save Our Wild Native, European & Flat Oyster (Ostrea edulis)http://coastwatch.org/europe/wp-content/uploads/2014/02/The-Native-Oyster.pdf

[3] National Economic and Social Council (2016 'Sustainable Development in Irish Aquaculture'. http://opac.oireachtas.ie/AWData/Library3/CAODocsliad160617_153546.pdf)

Disturbance to Birds and Other Species

Some aquaculture activities have been found to cause disturbance to birds, not only the aquaculture itself, but also associated activities. As mentioned previously, aquaculture licensing must ensure it meets the legal obligations to prevent deterioration of the conservation status of designated habitats and species within SPAs and SACs and thus avoid significant disturbance to these species.

In relation to mussel fisheries, as some birds feed on mussel seed stocks, they have the potential to be affected (e.g. by scaring devices). Particular care should be taken with regard to aquaculture in SPAs.
In relation to oyster farming licensing, the cumulative effect of trestles on birds must be taken into account. According to a study by Gittings and O'Donoghue[4], carried out in Dungarvan Bay SPA, it was found that some species of birds demonstrated a negative response to oyster trestle aquaculture; Shelduck, Ringed Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Great Black-backed Gull. The negative response to oyster trestle blocks in the study is suggested to be "a behavioural response by species where the oyster trestles interfere with their flocking behaviour", making it difficult "for individuals in large flocks to remain in contact as they become dispersed across several lines of trestles." Additionally, it has been acknowledged in the Appropriate Assessments carried out for a number of the SPAs and SACs where licences have been granted, that potential displacement could happen, for example in the case of Cummeen Strand and Drumcliff Bay, Co. Sligo or Inner Galway Bay for example. While some levels of disturbance have been predicted to be below the threshold for given species, more data is needed and consideration should also be taken of effects of further licensing.

Additionally, in-combination effects must also be a major consideration for further aquaculture licensing, as with example of Inner Galway Bay SPA. It was acknowledged in the Appropriate Assessment for this site that there could be potential displacement of species such as Great Northern Diver and Ringed Plover due to the in-combination effects arising from additional development, such as the Mutton Island Wastewater Treatment Plant.
In general, the licensing process must account for not only planning works such as these, but also the cumulative effects of other aquaculture activities in the surrounding area and the associated human activities these may entail, (such as transportation of the product) and recreational activities.
Also within this SPA, the Appropriate Assessment acknowledges potential negative impact from bottom mussel cultivation on sandwich and common tern, in terms of their food sources and thus potentially the productivity of the breeding colony**.**
While it is positive that mitigation measures have been introduced and licenses in such cases have not been granted, it is important that the precautionary principle continues to be invoked. This should not only be in regard to this type of aquaculture, but also in cases where data on effects to species is lacking and where it is not possible to discount potential negative impacts.
In cases where mitigation measures have been introduced or recommended, it must be ensured that these measures achieve the desired effect of protecting the species in

[4] Gittings, T. & O'Donoghue, P.D. (2012). The effects of intertidal oyster culture on the spatial distribution of waterbirds. Report prepared for the Marine Institute. Atkins, Cork.

question and that these conditions continue to be integrated fully into any future or renewed licensing.

While current data would suggest that impacts are less pronounced for other species, such as harbour seal, otter, maerl-dominated communities, care must be taken that subsequent licensing continues to demonstrate cognisance of any potential negative effects.

Finfish aquaculture

There are a number of negative environmental impacts associated with finfish aquaculture and salmon farming in particular, discussed below, which must be addressed. Some of these impacts could be addressed by moving away from open sea cages towards closed containment systems. There are a number of arguments in favour of closed containment systems, which will be elaborated on further on in this submission.

Nutrient input

One of the main issues in finfish aquaculture relates to the output of uneaten fish food and fish faecal deposits entering the water body, causing a decrease in available oxygen, which in turn leads to negative changes in the benthic community on the sea floor, such as algal blooms. Pollution in receiving waters can have a major negative impact on biodiversity, which has become a common concern in cage and pen culture. [5]

Data released by the Scottish Environmental Protection Agency (SEPA) revealed that assessments of the seabed conditions under and around fish farms in Scotland from 2009-2011, found that 44% were "unsatisfactory" (i.e. beyond the assimilative capacity of the local environment), 21% were "borderline" (i.e. close to having an unsustainable impact), while only 34% were found to be "satisfactory."[6]

Some studies show that waste stream tends to accumulate in mass and can be found significant distances from the source. [7] In many cases, the output far exceeds the normal carrying capacity of these water bodies. Therefore regular monitoring of the water body prior to and after the granting of a license is crucial, ensuring that negative environmental consequences are identified and addressed quickly.

Fish Food

Marine finfish aquaculture has been criticised for being heavily dependent on wild fish for use as feed, which serves to increase fishing pressure on marine fish stocks, with pellets made from fishmeal and fish oil resources being a commonly used food for such aquaculture. The fish used in this feed are caught from the wild and it is estimated that for

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[5] James S. Diana (2009) 'Aquaculture Production and Biodiversity Conservation' BioScience 59 (1): 27-38. DOI: https://doi.org/10.1525/bio.2009.59.1.7

[6] Salmon and Trout Association, (2012) Organic pollution of the sea bed under fish farms in Scottish sea lochs 2009-2011
http://www.salmon-troutscotland.org/pdf/S&TA_Report_organic_pollution_report_August_2012.pdf

[7] Subhas K. Venayagamoorthy, Hyeyun Ku, Oliver B. Fringer, Alice Chiu, Rosamond L. Naylor and Jeffrey R. Koseff. (2011) Numerical modeling of aquaculture dissolved waste transport in a coastal embayment. Environ Fluid Mech DOI 10.1007/s10652-011-9209-0
https://www.researchgate.net/publication/225715775_Numerical_modeling_of_aquaculture_dissolved_waste_transport_in_a_coastal_embayment

each 1 kg of farmed salmon, up to 4 kg of wild caught fish is needed. As salmon farming increases, there will be further pressure on these wild populations.
In terms of sustainability feed provision has been found to be the "single most important contributor to resource use and emissions associated with the farm-gate production of salmonids cultured in net-pen systems" (Pelletier et al., 2009). [8]
At a time when a huge number of the world's fisheries are overfished, it is important to ensure that the fish going into salmon food is sustainably caught by responsible operators. Further measures should be taken to find sustainable alternatives.
It is a welcome development that supposed viable and more sustainable alternatives, such as fish processing waste (trimmings) have been introduced. The use of these resources must also remain within the boundaries of sustainable production. Replacing fish and animal protein with vegetable based equivalents to supposedly reduce associated impacts reduces pressure on wild stocks. However, it can also be the case that such alternatives, for example, canola/wheat gluten are "more resource and emissions intensive than the most efficient fisheries products considered" (such as menhaden meal and oil). [9] Therefore, the licensing process and policies need to take account of resource use and emissions associated with the salmon farming supply chain in its entirety. This should be taken into account during the EIA process.

Disease

A further problem is the introduction and spread of disease and parasites as a consequence of aquaculture. Of particular concern in relation to salmon farming is the link between the production of sea lice on fish farms and the decline in wild sea trout and salmon populations in the west of Ireland (and elsewhere). (It is worth noting that Atlantic salmon is an Annex II protected species under the Habitats Directive.) Research investigating this issue has been carried out in Ireland, Scotland and elsewhere. A study in British Columbia in Canada for example, found sea lice were 8.8 times more abundant on wild fish near farms holding adult salmon and 5.0 times more abundant on wild fish near farms holding smolts than in areas distant from salmon farms, which could not be explained by salinity and temperature differences.[10] The findings of several studies suggest that sea lice from salmon farms play a major role in the collapse of wild sea trout populations and are implicated in declines in salmon numbers. Dr. Mark Costello of the Institute of Marine Science, University of Auckland, and a Technical Consultant to Ireland's Aquaculture Licences Appeals Board in its early years, makes clear, that sea lice "have proven difficult to control on farms, especially large farms because it is difficult to treat all fish simultaneously against the parasite"; furthermore, lice emanating from farms have, Dr. Costello reports, "been linked to epizootics (mass fatal parasite infestations) on wild salmonids (salmon, trout and their relatives) in Ireland, Scotland, Norway and Canada".

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[8] Pelletier, N., P. Tyedmers, U. Sonesson, A. Scholz, F. Ziegler, A. Flysjo, S. Kruse, B. Cancino, and H. Silverman. (2009) 'Not All Salmon Are Created Equal: Life Cycle Assessment (LCA) of Global Salmon Farming Systems'. *Environmental Science & Technology*: 49 (24), 14176-14183.

[9] Pelltetier et al. (2009).

[10] Alexandra Morton, Richard Routledge, Corey Peet, Aleria Ladwig (2004)
'Sea lice (Lepeophtheirus salmonis) infection rates on juvenile pink (Oncorhynchus gorbuscha) and chum (Oncorhynchus keta) salmon in the nearshore marine environment of British Columbia'. *Canada Canadian Journal of Fisheries and Aquatic Sciences,* Vol. 61, No. 2 : pp. 147-157 (doi: 10.1139/f04-016)
http://www.nrcresearchpress.com/doi/abs/10.1139/f04-016

Another potential problem is the increasing resistance of sea lice to current treatments, which results in fish farmers using higher doses of chemicals to treat for sea lice. Data released by SEPA showed that there was a 110% increase in the amounts of chemicals used to treat sea lice due to increasing resistance. However, there was only a 22% increase in the level of salmon production in the same period. The chemicals used can be highly toxic to marine species such as lobsters and prawns. It is acknowledged as positive that measures have been taken to deal with sealice in a more robust way while also in some cases reducing the toxicity of chemicals used. Nevertheless more must be done to ensure 100% effectiveness, and no adverse impacts. Therefore closed containment is a possible viable solution as elaborated on below.
The apparent debate regarding the validity of results and conflicting opinion in relation to studies undertaken, only serves to highlight the necessity of adhering to the precautionary principle, as the risk otherwise may be too great and the effects irreversible.

Escapees

The impact of escaped farmed salmon on the genetic integrity of wild stocks also poses a potential threat. A 37-year study of the influence of farmed fish on wild populations in the Burrishoole River catchment in Co. Mayo found that 'hybrid' Atlantic salmon showed significantly reduced survival capacity compared with wild fish.

Closed containment systems

"An increasing body of evidence shows that land-based, closed-containment aquaculture is an environmentally, technically and economically viable option to net-pen aquaculture....It's generally accepted that closed containment aquaculture has the ability to drastically reduce environmental impacts on the marine environment." - David Suzuki Foundation [11]

Many benefits have been reported with regard to closed containment systems. Disease is one of the major considerations, as closed systems are reported to reduce or eliminate the interaction between wild and farmed fish populations, therefore preventing spread of sea lice to juvenile wild salmon.

Additionally, the solid barrier of closed systems should reduce or eliminate the need for chemical and antibiotic treatment. Closed containment also facilitates the recovery of solid waste, which can be treated and composted. It is also possible for water to be recycled. With regard to inputs, due to more controlled conditions, closed systems can also use significantly less feed during shorter growing periods. A major benefit of closed systems is the elimination of the risk of escapes, which will help to protect the genetic integrity of wild populations. It also eliminates interaction with marine predators, which in turn ultimately protects those species from interference in their own habitats.

[11] David Suzuki Foundation http://www.davidsuzuki.org/issues/oceans/science/sustainable-fisheries-and-aquaculture/closed-containment-is-affordable/

The ecological footprint of open net-pen aquaculture can be significant and thus many of the issues could be mitigated by closed containment systems. The question of energy consumption arises in relation to closed containment systems and this must also be taken into consideration with regard to sustainability.

Lack of proper consultation and issues of administration of licensing

There has been the issue of lack of sufficient public consultation, in relation to the granting of licences. Additionally, the licensing system can be ultimately regarded as flawed due to its structure. The agencies which are to advise and regulate the process fall under the remit of the Fisheries Division and therefore their duties can be considered as undermined or compromised. The allocation of responsibility for managing budgets and staffing resources of the Marine Institute and Sea Fisheries Protection Authority (SFPA), to the Fisheries/Marine Division undermines their independence as this Division's main function is industry development.
The negative impacts which can arise from aquaculture activities in relation to habitats, species and communities overall must be taken into account. Sufficient consultation must be provided for, in order to facilitate the vocalisation of concerns over the environmental and other impacts that aquaculture can have. The pressure to grow the industry must not become an overarching goal, but remain in balance with sustainable production, for the benefit of communities and ecosystems in tandem.

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Aisling Kirwan

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