Alab, Info

From: Tastail Ulster [redacted]
Sent: Monday 2 November 2026 16:14
To: Alab, Info
Cc: [redacted]
Subject: Formal Objection to Pacific Oyster Cultivation in Ballyness Bay, County Donegal – Scientific Evidence of Waste Production and Environmental Risk

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Dear Minister Heydon,

I am writing to express my strong opposition to the proposed large-scale cultivation of Pacific oysters (*Magallana gigas*, formerly *Crassostrea gigas*) in Ballyness Bay, County Donegal.

My objection is based on international scientific research demonstrating that Pacific oysters produce significant quantities of faeces and pseudofaeces, that intensive oyster cultivation can alter seabed conditions and marine ecosystems, and that even triploid Pacific oysters cannot be guaranteed to be completely reproductively sterile.

Ballyness Bay is an outstanding natural coastal environment, valued by local communities and visitors for its scenery, wildlife, bathing, kayaking, fishing and other recreational activities. I am deeply concerned that the proposed aquaculture development could compromise the qualities that make this bay so special.

1. Scientific evidence of Pacific oyster faecal production

Pacific oysters are filter-feeding shellfish. As they filter seawater, they produce two distinct types of material:

- **Faeces:** Material ingested, digested and subsequently expelled by the oyster.
- **Pseudofaeces:** Particles removed from seawater but rejected before digestion, usually bound together with mucus.

Together, these materials are described as *biodeposits*.

Both can contribute to the accumulation of organic and particulate material on the seabed, although their composition and environmental effects differ.

A Japanese study, *Fundamental Studies on the Deterioration of Oyster Growing Grounds: Part 1 — Production of Fecal Materials by the Japanese Oyster*, reported substantial seasonal variations in faecal production.

The reported daily quantities, expressed as dry weight per oyster, included:

- June: approximately 4 milligrams.
- October: approximately 240 milligrams.
- Winter: approximately 80–100 milligrams.

These figures demonstrate that oyster faecal production can vary considerably with environmental and seasonal conditions.

Using an illustrative daily production rate of 100 milligrams per oyster, the equivalent quantities are:

Period	Dry faecal production per oyster
Daily	0.1 grams
Weekly	0.7 grams
Annually	36.5 grams

The annual figure is a mathematical extrapolation, not a directly measured annual average.

Nevertheless, when multiplied across potentially hundreds of thousands or millions of cultivated oysters, even relatively small individual quantities become substantial.

2. International research confirms significant biodeposition

Research undertaken in different parts of the world has demonstrated that Pacific oysters produce measurable quantities of waste material.

Published measurements and research summaries include:

Research location	Reported daily biodeposition per oyster	Annual equivalent
South Korea	41.8 mg	15.3 g
British Columbia, Canada	120–220 mg	43.8–80.3 g
Tasmania, Australia	60–290 mg	21.9–105.9 g

These figures concern dry-weight biodeposition, which may include both faeces and pseudofaeces. The annual quantities are extrapolated from daily rates and should not be interpreted as directly measured annual totals.

A South Korean study published in *PLOS ONE* in 2018 examined the physiological processes and energy budgets of Pacific oysters cultivated using submerged longlines. It reported an average biodeposition rate of approximately 41.8 milligrams per oyster per day.

For illustration, at that daily rate, a population of one million oysters would produce approximately:

- **41.8 kilograms of dry biodeposits per day.**
- **292.6 kilograms per week.**
- **15.26 tonnes per year.**

These figures are illustrative rather than predictions for Ballyness Bay. Actual production would depend on oyster numbers, size, season, food availability and local environmental conditions.

3. Particularly concerning research from Brazil

One of the most striking studies is a recent investigation conducted in Santa Catarina, Brazil, entitled *Modeling the filter-feeding behavior of the Pacific oyster (Crassostrea gigas) in response to natural variations in seston availability in Santa Catarina, Brazil*, published in *Aquaculture and Fisheries*.

Using field measurements and a mathematical model of oyster feeding behaviour, the researchers estimated that a representative three-hectare Pacific oyster farm could produce annually:

- **18.13 tonnes of faeces.**
- **74.15 tonnes of pseudofaeces.**
- **A combined total of approximately 92.28 tonnes of biodeposits.**

The model represented a farm containing approximately 1,056,000 oysters.

These are modelled figures for Brazilian farming conditions, not measured quantities from Ballyness Bay. Nevertheless, they demonstrate the potentially considerable scale of waste generation associated with intensive Pacific oyster cultivation.

This is particularly concerning in the context of Ballyness Bay.

According to information published by the Save Ballyness Bay campaign, the aquaculture licences upheld by the Aquaculture Licences Appeals Board in May 2024 cover just over 20 hectares of the bay.

That is a substantially greater licensed area than the three-hectare Brazilian model farm.

I recognise that differences in stocking density, cultivation methods, environmental conditions and oyster numbers mean that the Brazilian results cannot simply be multiplied by the area of Ballyness Bay.

However, the scale of the licensed area raises an important question: **What quantity of faeces and pseudofaeces could be produced annually if all licensed oyster cultivation sites in Ballyness Bay became operational?**

If the licences permit the cultivation of hundreds of thousands or potentially millions of oysters, I believe the Department must provide a transparent, scientifically robust estimate of the total waste load.

It is unacceptable, in my view, to proceed without publicly demonstrating that the cumulative environmental consequences have been adequately assessed.

4. Potential consequences for the seabed and marine biodiversity

The environmental concern is not simply that oysters produce faeces. It is what happens to that material after it enters the marine environment.

Faeces and pseudofaeces can settle on the seabed, where their accumulation and decomposition may alter sediment conditions.

International research into oyster aquaculture has identified potential consequences including:

- Increased deposition of organic and fine particulate material.
- Changes in sediment chemistry and nutrient cycling.
- Reduced oxygen availability in organically enriched sediments.
- Increased ammonia or sulphide under certain environmental conditions.
- Changes in the abundance and composition of seabed organisms.

Research by Mitchell (2006), published in *Aquaculture*, examined biodeposition beneath a commercial Pacific oyster farm in Tasmania, Australia, demonstrating the potential for cultivation to substantially increase sediment deposition.

Other studies of intertidal oyster cultivation have documented changes in sediment composition, organic enrichment and benthic communities.

The severity of these effects depends on site-specific conditions, including tidal circulation, water depth, stocking density and the sensitivity of local habitats.

These findings raise legitimate concerns about the long-term ecological consequences of intensive oyster cultivation in Ballyness Bay.

5. Protection of Ballyness Bay's water quality and recreational value

The scientific evidence outlined above establishes that Pacific oyster cultivation can introduce substantial quantities of biological waste into coastal environments and, under certain conditions, adversely affect sediment quality and marine habitats.

Ballyness Bay is currently valued as a relatively unspoilt coastal environment. Its waters and surrounding beaches are enjoyed for bathing, kayaking, fishing and numerous other recreational activities by local residents and many tourists.

The area is also valued for its natural beauty and the quality of its coastal environment, including the recognised bathing-water amenities in the wider locality.

I am deeply concerned that allowing intensive oyster cultivation could introduce new environmental pressures into a bay whose natural condition is itself an important public asset.

While oyster faeces are not equivalent to untreated human sewage, the accumulation and decomposition of oyster biodeposits can contribute to organic enrichment and changes in sediment conditions.

It would be wholly unacceptable to expose Ballyness Bay to a potentially substantial and avoidable burden of biological waste without first demonstrating, through independent scientific assessment, that its water quality, seabed habitats, native wildlife and recreational value will be protected.

The potential environmental consequences extend beyond marine ecology. Any deterioration in the quality, appearance or reputation of the bay could also affect the enjoyment of the area by residents and visitors and undermine the tourism economy that depends upon its natural beauty.

I believe the Department has a responsibility to give proper weight to these environmental, recreational and economic considerations.

6. The cumulative scale of the proposed development

A further concern is that the environmental impact of individual aquaculture sites may not adequately reflect the combined consequences of several operations within the same bay.

Where multiple sites are cultivated simultaneously, their cumulative waste production may be considerable.

For example, using the South Korean research figure of 41.8 milligrams of dry biodeposits per oyster per day:

Illustrative oyster population	Estimated annual dry biodeposits
100,000 oysters	1.53 tonnes
500,000 oysters	7.63 tonnes
1 million oysters	15.26 tonnes
2 million oysters	30.51 tonnes

These are illustrative calculations based on a constant daily rate, not forecasts of actual Ballyness Bay production.

The Department should establish the maximum permitted and anticipated stocking numbers for all licensed sites, rather than relying on estimates based solely on the number of hectares.

The combined effects on sediment deposition, water circulation, nutrient cycling and native species must then be assessed across the entire bay.

7. The risk of reproduction and establishment of an invasive non-native species

A further serious concern is the potential for Pacific oysters, a non-native species with documented invasive behaviour in parts of Europe, to reproduce and establish self-sustaining populations in Ballyness Bay.

Scientific research clearly demonstrates that triploid Pacific oysters, although frequently described as sterile, **cannot be guaranteed to be 100% reproductively sterile**.

Pacific oysters reproduce through broadcast spawning, releasing eggs and sperm into the surrounding seawater, where external fertilisation can occur. A reproductively active female can release millions of eggs during spawning.

Research published in *Heredity* in 2004, examining chromosome inheritance in triploid Pacific oysters, demonstrated that triploid oysters can produce viable offspring under experimental

conditions. The study reported that triploid female fecundity was approximately 13.4% of that of normal diploid females in the experimental crosses, although offspring survival was very low.

Further research published in 2014 identified different reproductive patterns among triploid Pacific oysters, with some individuals exhibiting advanced gamete development despite the substantially reduced fertility generally associated with triploidy.

More recent research published in 2024 and 2025 has continued to investigate impaired sperm development and the biological mechanisms underlying fertility and infertility in triploid Pacific oysters.

The scientific conclusion is therefore clear: triploidy greatly reduces reproductive capacity, but it does not provide an absolute guarantee that Pacific oysters cannot reproduce.

This has particularly serious implications when considering the potentially very large numbers of oysters that could be cultivated in Ballyness Bay.

Even where only a relatively small proportion of oysters retain reproductive capacity, the presence of hundreds of thousands or potentially millions of animals raises legitimate concerns about the release of viable reproductive material into the marine environment.

Given the broadcast-spawning biology of Pacific oysters, the documented residual fertility of some triploid individuals and the scale of the proposed cultivation, there is a credible risk of successful reproduction, larval dispersal and eventual establishment beyond the licensed cultivation areas.

While the available research does not establish that large-scale reproduction in Ballyness Bay is inevitable, **it clearly demonstrates that claims of complete reproductive containment cannot be justified solely on the basis that cultivated oysters are triploid**.

The potential consequences for native marine species and habitats must not be underestimated.

If Pacific oysters establish self-sustaining populations outside cultivation sites, they may compete with native shellfish for space and resources, alter intertidal habitats and change the ecological character of the bay.

I therefore ask the Department to explain how it has assessed the risk of reproductive escape and establishment, particularly under scenarios involving maximum stocking densities and multiple cultivation sites.

It is not sufficient simply to describe the oysters as sterile. The Department must demonstrate, using independent scientific evidence, that the proposed cultivation will not create an unacceptable risk of introducing or establishing an invasive non-native species in Ballyness Bay.

This issue is especially important because, once an invasive species has established a reproducing population in a natural marine environment, controlling or removing it may prove extremely difficult.

The protection of Ballyness Bay's native biodiversity must take precedence over assurances of sterility that are not fully supported by the scientific literature.

8. Questions requiring a response from the Department

In light of the scientific evidence, I ask the Minister and Department to provide clear answers to the following questions:

1. What is the total area of Ballyness Bay currently licensed for Pacific oyster cultivation, and how many oysters could be cultivated at maximum permitted capacity?
2. Has the Department calculated the likely daily and annual quantities of faeces and pseudofaeces produced by all licensed operations?
3. Has independent hydrodynamic and sediment-dispersion modelling been undertaken to determine where this waste would settle or accumulate?
4. What scientific assessment has been undertaken of the potential impacts on sediment oxygen levels, nutrient cycling, ammonia, sulphide and native seabed organisms?
5. Have the cumulative effects of all licensed aquaculture operations been assessed together?
6. What baseline measurements of sediment quality, water quality and biodiversity are available, and will these be published?
7. What monitoring arrangements, environmental thresholds and enforceable corrective measures would apply if cultivation resulted in unacceptable organic enrichment or habitat deterioration?
8. How has the Department considered the importance of Ballyness Bay for tourism, bathing, kayaking, fishing and other recreational uses?
9. **Are the Pacific oysters proposed for cultivation diploid or triploid, and what independent evidence has been provided to demonstrate their reproductive status and fertility?**
10. **Has the Department assessed the potential for spawning, fertilisation, larval dispersal and establishment of Pacific oysters outside the licensed cultivation areas?**
11. **What measures would be required to prevent, detect and respond to the establishment of self-sustaining Pacific oyster populations in Ballyness Bay?**
12. **Has a cumulative invasive-species risk assessment been undertaken that considers the maximum potential number of oysters cultivated across all licensed sites?**

9. My formal request

I respectfully urge the Minister to reconsider the environmental implications of Pacific oyster cultivation in Ballyness Bay and to take all legally available steps to prevent cultivation from proceeding until the scientific evidence has been independently and comprehensively assessed.

In particular, I request that the Department publish:

- A site-specific assessment of the cumulative faecal and pseudofaecal waste expected from all licensed oyster operations.
- Independent scientific evidence demonstrating that this waste will not cause unacceptable harm to the bay's habitats, water quality or native marine life.
- A comprehensive assessment of the reproductive capacity of the oysters proposed for cultivation, including the possibility of viable offspring from triploid oysters.
- A site-specific assessment of the risk of Pacific oyster spawning, larval dispersal and establishment beyond the licensed cultivation sites.
- Details of the measures that would be taken to prevent and respond to the establishment of invasive Pacific oyster populations.

I also ask the Department to review whether the existing environmental assessments adequately reflect the international research into Pacific oyster biodeposition and reproductive biology.

Ballyness Bay is an irreplaceable natural resource. Its environmental quality, biodiversity, recreational value and contribution to local tourism deserve protection.

I do not believe that the economic interests associated with oyster cultivation should take precedence over the long-term environmental integrity of this remarkable coastal area.

Once natural marine habitats are degraded, or a non-native species becomes established, restoration can be difficult, expensive and uncertain.

I therefore strongly object to the proposed cultivation of Pacific oysters in Ballyness Bay and ask the Minister to apply a precautionary, evidence-based approach in considering its future.

I request a substantive written response to the scientific concerns and questions raised in this submission.

Yours sincerely,

Michael Brendan Crilly

[redacted]

Scientific references

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Fundamental Studies on the Deterioration of Oyster Growing Grounds: Part 1 — Production of Fecal Materials by the Japanese Oyster.

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7. Recent research on triploid male fertility

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8. Molecular mechanisms of infertility

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