



31 July 2023

Hon Tanya Plibersek MP
Minister for the Environment and Water
House of Representatives
Parliament House
Canberra ACT 2600

Dear Minister Plibersek,

Request for reconsideration of decision EPBC 2012/6406

1. We refer to our letter dated 08 June 2023, in relation to decision EPBC 2012/6406 dated 03 October 2012 (**Decision**).
2. As you know our letter was a request (**Request**), under section 78A of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**).
3. We imagine this will have been apparent from the language we used in [4] of our letter, but for abundant clarity we confirm that the Request is made relying on the grounds in:
 - (1) EPBC Act section 78(1)(a) (substantial new information); and/or
 - (2) EPBC Act section 78(1)(aa) (unforeseen substantial change in circumstances).
4. We provided you with new evidence from the Institute of Marine and Antarctic Studies, being Moreno & Semmons, "*Interim report – Macquarie Harbour Maugean skate population status and monitoring*" (2023) (**Moreno (2023)**).
5. The purpose of this letter is to provide you with further material relevant to our Request. In particular, we enclose together with this letter the following material, the significance of which we explain below.

Material	Abbreviation
Moreno <i>et al.</i> , " <i>Vulnerability of the endangered Maugean Skate population to degraded environmental conditions in Macquarie Harbour</i> " (2020)	Moreno (2020)

Ross <i>et al.</i> , “ <i>Understanding the Ecology of Dorvilleid Polychaetes in Macquarie Harbour</i> ” (2016)	Ross (2016)
Wild-Allen <i>et al.</i> , “ <i>Macquarie Harbour Oxygen Process model (FRDC 2016-067)</i> ” (2020)	Wild-Allen (2020)
Ross & MacLeod, “ <i>Environmental Research in Macquarie Harbour Interim Synopsis of Benthic and Water Column Conditions</i> ” (2017)	Ross (2017)

Further scientific material

6. In [7]–[8] of our letter we said that the report attributed a 47 per cent decline in Maugean Skate numbers in Macquarie Harbour to dissolved oxygen (**DO**) levels in the Harbour. These in turn were attributed to “*anthropogenic inputs*,” in particular including the large-scale development of salmonid aquaculture—*i.e.*, salmon and trout farming.
7. The additional material provided together with that letter supports that proposition, as we explain below. The overall picture and chronology of the research is, at a high level, as follows:
 - (1) Ross (2016) identified that finfish cages lead to elevated oxygen consumption, which may result in lower DO levels—in particular nearer to cages;
 - (2) Ross (2017) highlighted the very low levels of DO in the harbour, and the possibility of indirect interactions between salmonid farming and the Maugean Skate by virtue of decreased DO;
 - (3) Moreno (2020) examined the sensitivity of the Maugean Skate to decreased oxygen levels, and found that chronic exposure to hypoxic conditions leads to (*inter alia*) deleterious effects on reproduction;
 - (4) Wild-Allen (2020) modelled DO in Macquarie Harbour absent salmonid aquaculture and found a 50 per cent reduction in hypoxic volume, and a 43 per cent increase in healthy water would result from elimination of salmonid farming.



Ross (2016)

8. Ross (2016) was predominantly concerned with different species: Dorvilleid Polychaetes, being species of worms.
9. In the context of an examination of the ecology of those species in the harbour, however, the authors made findings about environmental characteristics of the harbour, including in relation to DO. At 21, the authors said as follows:

“At the lease scale, there was also a pattern in bottom water dissolved oxygen saturation with distance from cages at two of the leases. Dissolved oxygen at leases 266 and 219 showed a gradient of lower dissolved oxygen saturation at cage sites that increased to background levels by approximately 100m, Figure 5-9. These two leases also had more sites with low (<25%) or extremely low (<5%) bottom water dissolved oxygen. At lease 133 and 267 there was no clear pattern with distance.”

10. And, at 43, they observed that *“it is not surprising, and in fact expected that the enrichment under finfish cage will lead to elevated oxygen consumption, and as a consequence, in areas where there is reduced water exchange or high levels of enrichment this could result in localised drawdown of bottom water oxygen concentrations.”*

Ross (2017)

11. Ross (2017) is an interim synopsis of the science and current status of the benthic (*i.e.*, harbour floor) and water column environments in Macquarie Harbour.¹ It was performed in a context of, as outlined on page 3, a steady increase in caged finfish in the harbour.
12. The critical finding in Ross (2017), in the context of the Request, is that although direct interactions between the Maugean Skate and aquaculture operations appear to be limited, there may be indirect interactions—including that the production of organic wastes from the farming activities increase biological oxygen demand and hence decreased DO.²

¹ Ross (2017), 3.
² Ross (2017), 10.

13. Further, Ross & MacLeod found the following in relation to DO levels in comparison with past levels:³

“In mid-2014 there was some respite from the steady decline in bottom water DO levels that had been occurring since 2009 (Figure 23). However, DO levels were and still remain well below the levels recorded between 1993 and 2009 (Figure 23). DO levels are now extremely low throughout the Harbour, but most notably in the southern part of the Harbour. All of the independent data sets (industry, EPA, Sense-T, Parks, IMAS and CSIRO) are providing the same picture; DO levels in bottom waters are now worryingly low.”

14. Even small changes in DO levels are important:⁴

“The study also shows that very small changes in DO, particularly at low levels, can have a major effect on the ecological response – this is particularly relevant to the levels of DO currently seen in Macquarie Harbour, suggesting that even slight declines/ improvements where levels are so low can have quite marked consequences.”

15. Figure 28 (reproduced below) shows that even short-term reductions in DO levels lead to behavioural modification and death:

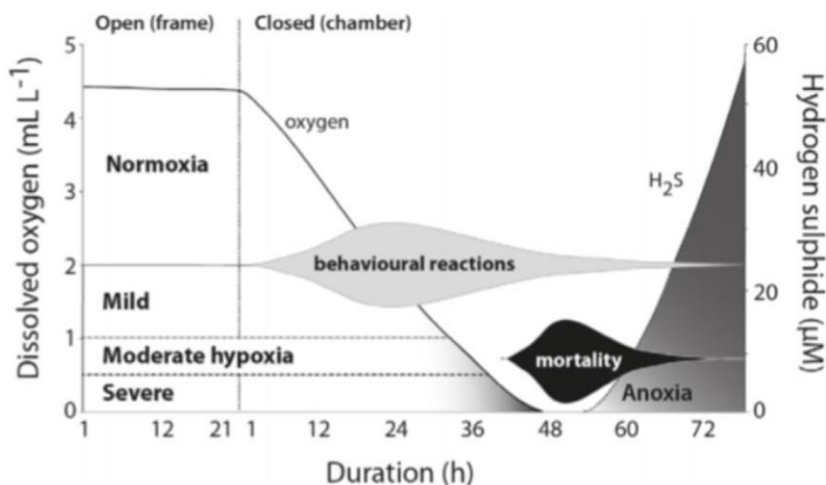


Figure 28 Schematic diagram reproduced with permission from Riedel et al. (2014) highlighting the effects of DO concentrations and exposure duration on behaviour and mortality.

16. Ross (2017) proposed further research in relation to the effect of farming on DO levels in the Harbour.⁵

³ Ross (2017), 23.

⁴ Ross (2017), 29.

⁵ Ross (2017), 33.



Moreno (2020)

17. Moreno (2020) is an examination of *“the vulnerability of the Maugean Skate, across all its life history stages, to a range of environmental stressors,”* in the context of, *“anthropogenic activities in and around the estuary (e.g. mining, forestry, hydro-electricity generation, and marine farming operations) as well as the more general effects of climate change.”*⁶
18. As background, deoxygenation is likely to be of particular importance for elasmobranchs (such as the Maugean Skate), because of their comparatively high oxygen demands.⁷ Increasing temperatures result in higher oxygen consumption rates in elasmobranchs.⁸
19. In this context, critical findings in Moreno (2020) include that the Maugean Skate is vulnerable to degraded and variable environmental conditions in Macquarie Harbour,⁹ and has little ability to tolerate low DO.¹⁰ Skates in Macquarie Harbour move through areas that are severely oxygen deprived,¹¹ and are capable of surviving chronic exposure to hypoxic (*i.e.*, inadequate oxygen) conditions (<20% DO) only by using metabolic depression as a survival strategy.¹² This cannot be sustained long-term, because it occurs at the cost of other energy-intensive life history processes such as growth, foraging, and reproduction.¹³ Accordingly, levels of DO in bottom waters in Macquarie Harbour is likely to represent a crucial factor in the future well-being of the skate population.¹⁴
20. In particular, given the Skate’s maturation and asynchronous reproductive strategy, lengthy periods of depressed metabolic rates could *“greatly reduce its growth/maturation rate and capacity to reproduce, limiting any increases in the population under these conditions.”*¹⁵

⁶ Moreno (2020), viii.

⁷ Moreno (2020), 47.

⁸ Moreno (2020), 48.

⁹ Moreno (2020), 43.

¹⁰ Moreno (2020), 1.

¹¹ Moreno (2020), 47–48.

¹² Moreno (2020), x, 43, 51, 55.

¹³ Moreno (2020), x, 52, 55. See also Ross (2017) at 8.

¹⁴ Moreno (2020), 1, 55.

¹⁵ Moreno (2020), 52.

21. A factor contributing to the environmental conditions in Macquarie Harbour, in particular to the levels of DO in bottom waters, is aquaculture (*i.e.*, salmonid farming).¹⁶

Wild-Allen (2020)

22. Moreno (2023) and Moreno (2020) both find that aquaculture contributes to environmental conditions (*i.e.*, lower DO levels in Macquarie Harbour). Wild-Allen (2020) discusses modelling performed to identify the degree to which DO would improve were it not for salmonid farming.
23. Farmed fish respiration is the third greatest contributor to loss in DO in Macquarie Harbour (accounting for 3 per cent of loss).¹⁷ Modelling based on reduced anthropogenic loads (*i.e.*, omission of fish farm respiration and nutrient loads) resulted in a 50 per cent reduction in hypoxic water and a 40 per cent reduction in hypoxic sediment.¹⁸ Various other scenarios were modelled;¹⁹ the “*reduced anthropogenic load scenarios showed a larger reduction in hypoxia under comparable ocean oxygen influx c.f. all other scenarios.*”²⁰
24. It is worthwhile quoting from the discussion of Harbour water quality under reduced anthropogenic load at some length (emphasis added):²¹

“To explore the impact of anthropogenic loads on dissolved oxygen conditions in the harbour, a scenario simulation was run omitting fish farm oxygen drawdown and dissolved and particulate waste. [Note that the small amount of waste from Strahan sewerage treatment plant remained in the simulation.] To investigate persistent changes in the environment the simulation was also extended for a further 2 years by repeating the 2017-18 hydrodynamic conditions.

Monthly mean distributions of dissolved oxygen (Figure 4.40) show an increase in dissolved oxygen in all seasons, particularly in mid water for the simulation with reduced anthropogenic load. The extended model scenario showed a greater increase in dissolved oxygen (>2mg/l) in a similar pattern throughout the harbour in particular in

¹⁶ Moreno (2020), 56.

¹⁷ Wild-Allen (2020), 6, 43

¹⁸ Wild-Allen (2020), 6, 51..

¹⁹ See the list of modelled scenarios at Wild-Allen (202), 52.

²⁰ Wild-Allen (2020), 7.

²¹ Wild-Allen (2020), 62–63.



the mid and southern part of the harbour.

Classification of oxygen conditions as anoxic (<1% oxygen saturation), hypoxic (1-30% oxygen saturation), intermediate (30-80% oxygen saturation) and healthy (>80% oxygen saturation) showed a 50% reduction in hypoxic volume and a 40% reduction in hypoxic sediment area under reduced anthropogenic loads c.f. conditions in 2017-18 (Figure 4.41). For the extended scenario run hypoxia was further reduced; healthy water volume increased from 46% in 2017-18 to 56% and healthy sediment area increased from 32% in 2017-18 to 36% of the total harbour area."

25. These improvements can be visually discerned in Figure 4.40,²² which shows actual DO levels in the left-hand column, modelled DO levels over the same 2017–2018 period but with “no farms” in the middle column, and modelled DO levels over an extended two-year period, again with “no farms,” in the right-hand column. The degree of improvement in the “no farms” scenario is obvious.
26. These differences were “*primarily due to the omission of fish farm oxygen drawdown.*”²³ “[R]educed anthropogenic load scenario and persistent reduced anthropogenic load scenario suggest that the net oxygen deficit would be reduced by >50% compared to 2017-18 conditions” (emphasis added).²⁴

Conclusion as to further scientific material

27. In short, the conclusions that are to be drawn from the material summarised above, together with Moreno (2023) (which we summarised in our earlier letter), are these:
- (1) Maugean Skate are vulnerable to lower levels of DO in Macquarie Harbour, in the sense that it may cause behaviour modification, may reduce reproduction, and may lead to death;
 - (2) absent salmonid aquaculture, there would be a dramatically higher volume of healthy DO water in the harbour, and (correspondingly) a dramatically lower volume of hypoxic water;

²² Wild-Allen (2020), 63.

²³ Wild-Allen (2020), 64.

²⁴ Wild-Allen (2020), 64.

(3) accordingly, absent salmonid aquaculture, there would be a dramatically less harmful environment for the Maugean Skate.

28. These findings, together with the analysis in Moreno (2023) itself, justify the conclusion in Moreno (2023) that the 47 per cent decline in Maugean Skate numbers in Macquarie Harbour is substantially attributable to salmonid farming.

Submission based on this conclusion

29. It is apparent from the Decision that the then-Minister proceeded on the basis that the conditions therein set out would enable salmonid farming to occur without any significant impacts on the Maugean Skate (see in particular point 1 on page 2).

30. The research summarised above, and in our earlier letter, shows that that basis was wrong. Assuming (which we do for the sake of this Request) that the conditions in the Decision have been complied with, the only available conclusion is that, despite this, salmonid aquaculture has had a significant impact on the Maugean Skate.

31. All of the research referred to in our previous letter, and in this one, is “*new information*,” in the sense that it was published after (in most cases long after) the Decision. It is “*substantial*” because it is the product of serious scientific inquiry and goes directly to the correctness (or otherwise, as the case has turned out to be) of the Minister’s assumption that the conditions imposed would prevent a significant impact.

32. The new information shows that the adverse impacts of the action are very substantially greater than the Minister thought at the time of making the Decision. That may be concluded with a high degree of certainty.

33. Alternatively, the circumstances as at today’s date are materially different from the circumstances in place at the time of the Decision, in at least two respects:

34. *First*, as Ross (2017) shows, there has been a continued decline in the DO levels in Macquarie Harbour such that they were “*worryingly low*” (lower than they were as at the time of the Decision).

35. *Second*, as Moreno (2023) shows, the Maugean Skate population has decreased by nearly half. That is, the population that may be (or, we submit, is) affected by the



relevant activity of salmonid farming is now very much more vulnerable than it was at the time of the original Decision.

36. These matters were plainly unforeseen: the Decision is precisely predicated on the notion that, as long as conditions are complied with, there should be no significant effect on the Maugean Skate. There has now, as Moreno (2023) shows, been a very significant effect on the Skate. For reasons articulated above, the change in circumstances is substantial, and relates to the adverse impacts of the action (salmonid farming) on the protected matter (the Maugean Skate).
37. In these circumstances, both of the grounds stated in section 78(1)(a) and (aa) exist. Revocation and substitution is plainly warranted: unless the effect of salmonid farming on the Maugean Skate is arrested (and reversed), it is very likely to become extinct.

Next steps and urgency

38. Above, we drew attention to the fact of hotter weather meaning higher oxygen demand in elasmobranchs (like the Maugean Skate)—see at [18]. If anything, in this light, the past several years of *La Niña* weather patterns (with cooler, wetter, weather) have likely prevented even worse declines in Maugean Skate populations.
39. But, as is widely known:
- (1) the forthcoming summer is very likely to be characterised by *El Niño* weather conditions;²⁵ and
 - (2) *El Niño* weather conditions are characterised by warmer-than-average temperatures.²⁶
40. The forthcoming summer, therefore, is likely to be extremely damaging for the Maugean Skate. To say that it is at extinction risk is not to overstate the peril it faces.
41. In these circumstances, we urge you to reconsider the original Decision, and make a new decision precluding salmonid aquaculture in Macquarie Harbour, as a matter of the highest urgency. We reserve our rights in this connection.

²⁵ See, e.g., <http://www.bom.gov.au/climate/enso/outlook/>.

²⁶ See, e.g., <http://www.bom.gov.au/climate/updates/articles/a008-el-nino-and-australia.shtml>.

42. Please do not hesitate to contact us should you require any further information.

Yours sincerely,

A handwritten signature in blue ink, consisting of several loops and a long horizontal stroke extending to the right.

Eloise Carr

Tasmanian Director

The Australia Institute