



# Tasmanian Government Submission - Addendum

Marine Farming Expansion, Macquarie Harbour, Tasmania and the *Environment Protection and Biodiversity Conservation Act 1999* - not controlled action if undertaken in a particular manner referral decision (EPBC 2012/6406)

October 2024

*Acknowledgement: Front cover photograph courtesy of the West Coast Council / Ollie Khedun*

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# 1 Introduction

This document is an addendum to the Tasmanian Government's February 2024 submission responding to three requests made to the Minister for the Environment and Water, the Hon Tanya Plibersek MP, to reconsider the decision in 2012 (EPBC 2012/6406) under section 75(1) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that the action – proposed Marine Farming Expansion, Macquarie Harbour, Tasmania – is not a controlled action if undertaken in a particular manner (NCA-PM).

The Tasmanian Government provided evidence in its submission to the reconsideration process that:

- There is no “substantial new information” about the impacts that the action has, or is likely to have, on the Maugean skate and the Tasmanian Wilderness World Heritage Area (TWWHA); and
- There has been no “substantial change in circumstances that was not foreseen” at the time of the 2012 decision relating to the impact the action has or will have or is likely to have.

The addendum provides important new and emerging information in relation to water quality and the population status of the Maugean skate.

The Tasmanian Government notes that a number of the requests for reconsideration outlined that the summer of 2024 was like to be extremely damaging to oxygen levels and the Maugean skate. The evidence within this document demonstrates the opposite to be true as dissolved oxygen (DO) levels are now within historical ranges (1993 to 2010) and recent Maugean skate population surveys have confirmed recruitment of juveniles into the population.

This new evidence indicates that water quality and population numbers of Maugean skate within the Harbour can improve concurrent with salmonid farming and questions whether the substantial new evidence presented during the reconsideration process is current, relevant or valid.

The additional information provided in this addendum supports the Tasmanian Government's submission that the existing Adaptive Management Framework (AMF) designed to monitor and sustainably manage salmonid production in the Harbour under the existing NCA-PM is fit for purpose and does not need to be revoked or substituted with an amended NCA-PM as the addition of any new controlling provisions are not warranted.

## 2 Water quality within Macquarie Harbour

In February 2024 the Tasmanian Government provided evidence that water quality data available at the time of lodging the submission indicated that DO levels within the Harbour were on a trajectory of improvement and no longer at the low levels documented in Ross’s and Macleod’s 2017 study, one of five documents submitted to support the reconsideration process.

The Tasmanian Government now provides the current water quality monitoring data for Macquarie Harbour which supports this initial statement. The data as presented by the Environment Protection Authority Tasmania (EPA) in the *Macquarie Harbour Status update for dissolved oxygen September 2024* report is included in full at Attachment 1.

It is important to note that the DO levels are for the timeframe of September 2023 – August 2024. This is before the Macquarie Harbour Oxygenation Project (MHOP) entered the final and more intensive stage of increasing the oxygen load delivered daily to 5,000 kg. The results of the MHOP are being analysed to determine if the process is effective at ameliorating low DO levels within the Harbour.

### A Overall health of the Harbour

The data presented in this addendum indicates that median DO levels across Macquarie Harbour are at their highest levels in more than a decade. The data provided is depicted for the three identified regions of Macquarie Harbour the North West (121), Central (120) and South East (119) as shown in Figure 1 below.

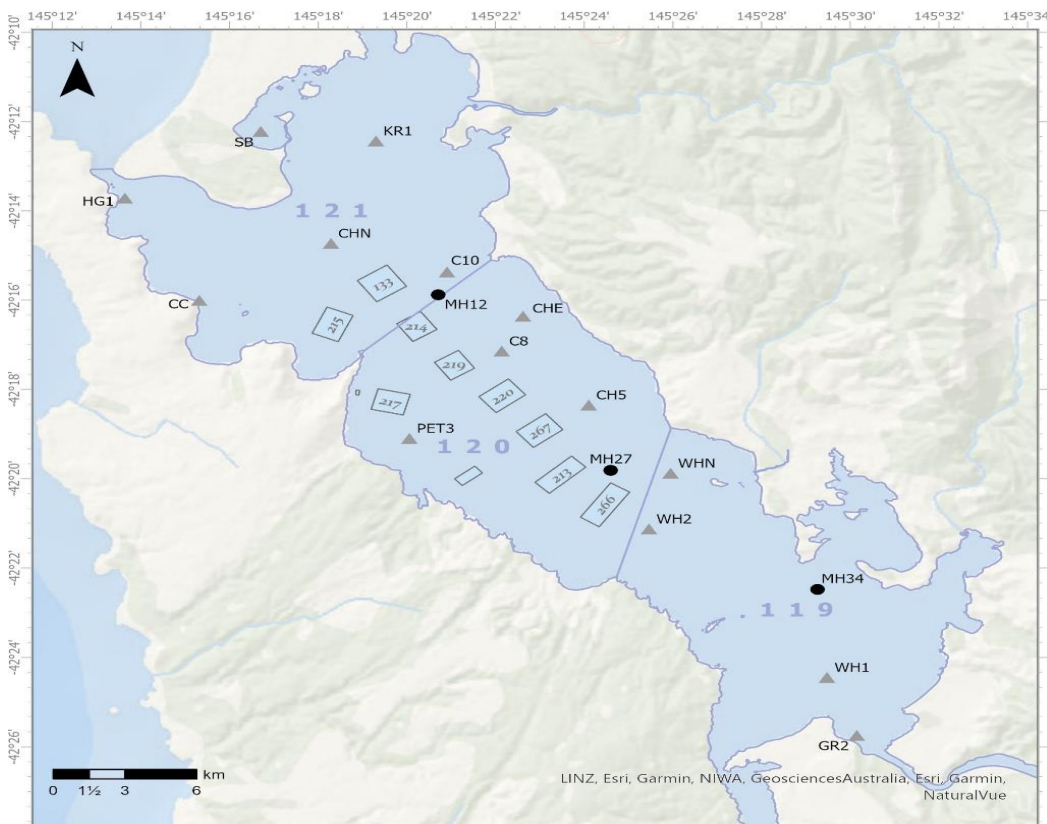


Figure 1: Monitoring segments within Macquarie Harbour

The results are reported against the Interim Default Guideline Values (DGVs) for the Harbour which are compared to monitoring data collected monthly from 14 sites for the period from September 2023 to August 2024.

DGVs are a nationally accepted method for establishing reference conditions for water quality parameters. They are data driven and provide an acceptable range or threshold for a given water quality parameter that could be expected to occur in a representative environment or ecosystem. The Harbour's DGVs (EPA November 2023) are considered to be very robust as they have been derived from over 33,000 individual data points collected from 40 sites across the Macquarie Harbour between 5 May 1993 to 14 October 2009 and are used to inform regulatory and management approaches.

DGVs support adaptive monitoring and management in addressing risk and provide a 'first port of call' to assess if measurements or conditions are outside of an expected or appropriate range for a given location, and therefore warrant further targeted investigation to see if there is risk to a particular value or values. Hence, they have been incorporated by the EPA into the AMF for salmonid farming in Macquarie Harbour and are included in the Environmental Licences for each Marine Farming Lease.

The data represented by the open circles on the Figures within this section are the median DO data calculated from 12 months of data from September 2016 to August 2017, and the data represented by the black circles are the median dissolved oxygen data calculated from 12 months of data from September 2023 to August 2024. Interim DGVs are represented in the Figures, with the blue window being above the interim DGV range, the green window being within the interim DGV range and the red window being below the interim DGV range.

#### (1) North West Macquarie Harbour

The DO conditions across the depth profile of North West Macquarie Harbour (Segment 121) have improved with the data also demonstrating that for the last 12 month sampling period DO levels across the entire depth range, are within the interim DGV ranges (refer to Figure 2) and are therefore in line with the DO range observed from 1993 to 2009.

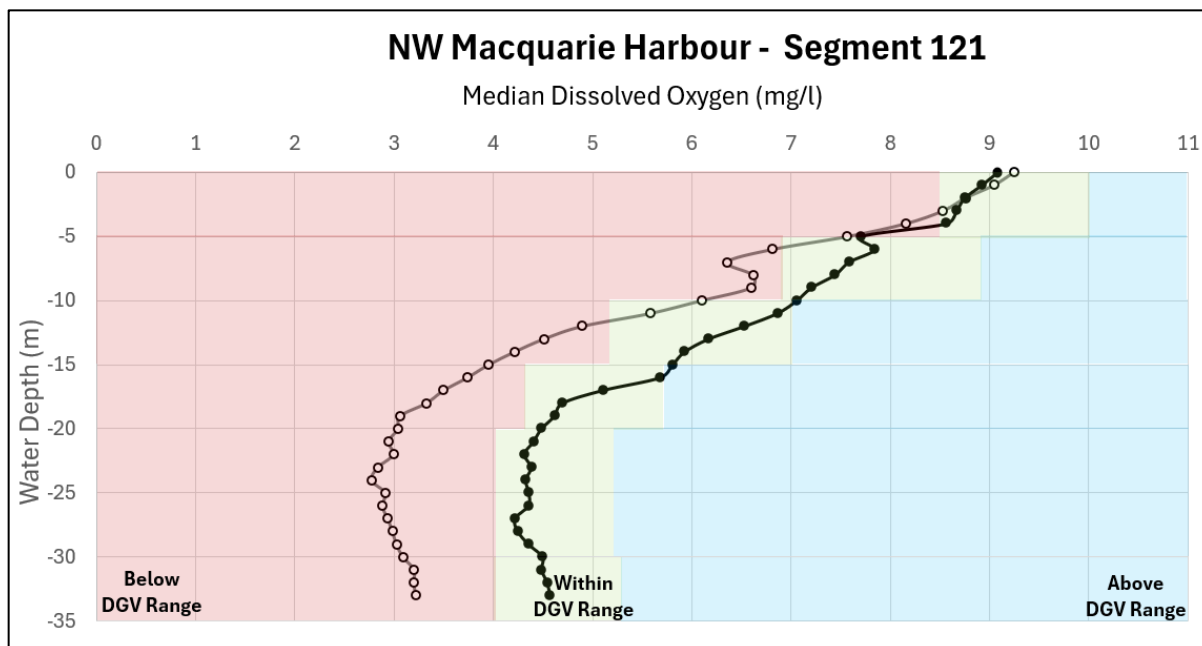


Figure 2: Median DO for the North West Segment

(2) Central Macquarie Harbour

The results show that DO conditions across the depth profile of Central Macquarie Harbour (Segment 120), where the majority of salmon are farmed, have improved over the last 12 month period for DO levels across the entire depth range surveyed. The data demonstrates that DO levels across the entire depth profile are within the published interim DGV ranges (refer to Figure 3) and are therefore in line with the DO range observed from 1993 to 2009.

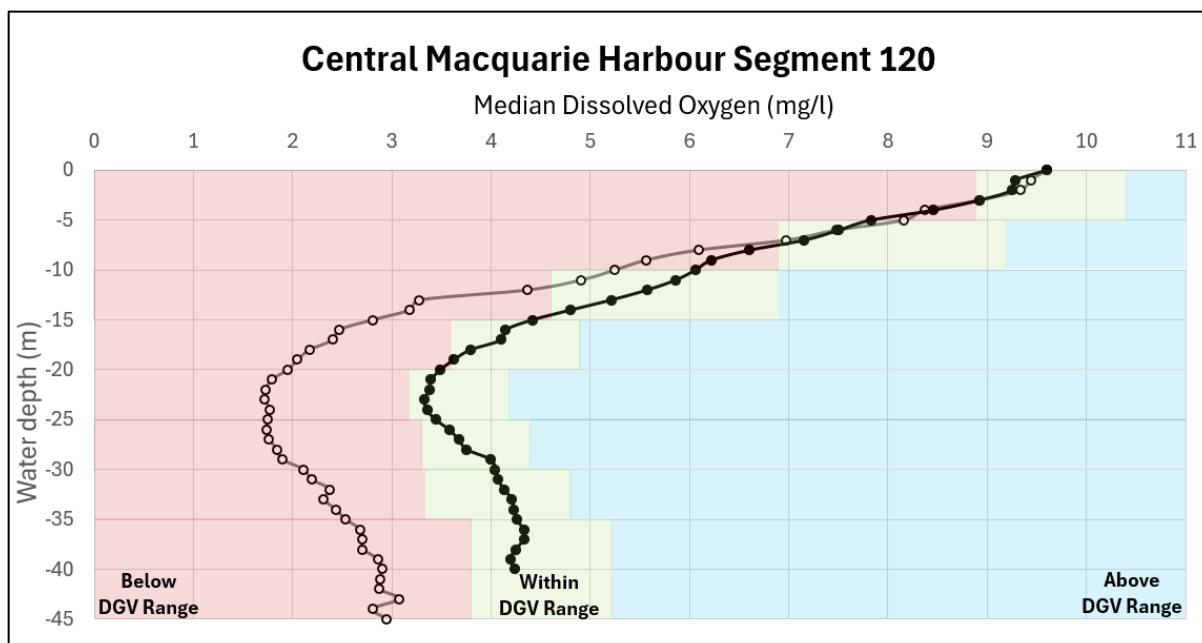
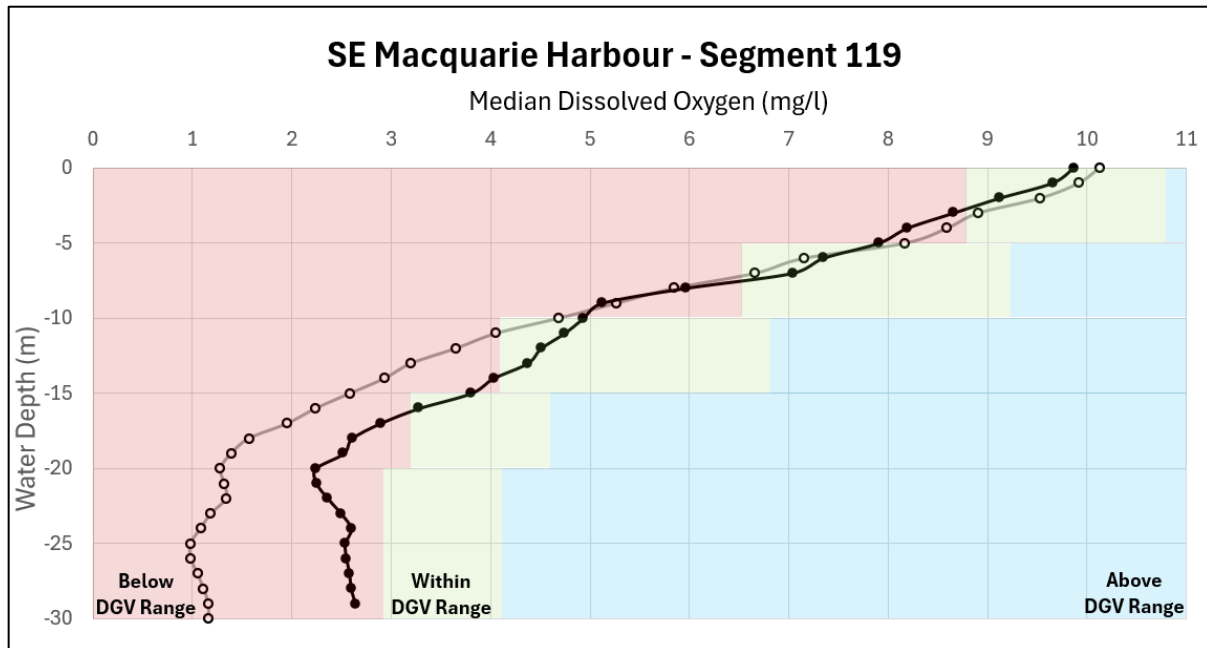


Figure 3: Median DO for the Central Macquarie Segment

### (3) South East Macquarie Harbour

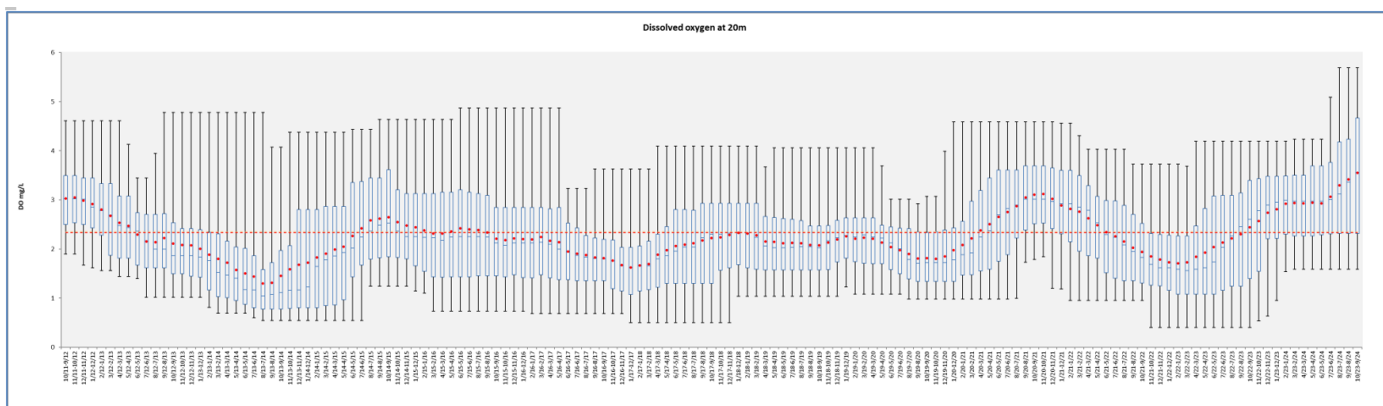
The DO conditions across the depth profile of South East region (Segment 119) have generally improved with the data demonstrating that above 10m, DO has remained stable and is within the DGV values. Between 10 and 16m median DO concentrations have improved with values within the DGV Range and below 16m there has been continual improvement in median DO concentrations. However, below 16m, further improvement of DO concentrations are needed within the South East segment to reach the interim DGV range. It is noted that habitat for the Maugean skate in this segment is considered to be shallow channels of 5 to 15m depth.



**Figure 4: Median DO for the North West Segment**

In summary, the above data continues to show that over a 30 year period there has been no substantive decline in DO in the Maugean skate's verified and preferred habitat of shallow (<15m depth) waters throughout Macquarie Harbour. The results also demonstrate that two thirds of Macquarie Harbour has middle and deeper waters exhibiting DO levels within the DGVs (and their historical range) with the remaining one third of Macquarie Harbour demonstrating DO levels close to the DGVs and historical range with an improving trend and reasonable prospects to further improve on the current trend, as described below.

The most recent data at twenty metres shows the upwards trend continuing in September (source EPA, 2024).



These results strongly confirm that the current management and regulatory settings for nitrogen inputs set under the current AMF are effectively managing any impacts from salmonid farming on the environment within Macquarie Harbour and that water quality can improve concurrent with salmon farming.

## B Additional Water Quality Monitoring and Modelling implemented under the AMF

As previously outlined, the EPA undertakes quarterly monitoring of physio-chemical, nutrient and metal data at 15 sites (since 1993) throughout Macquarie Harbour and installed an additional four continuous data loggers for DO at depths of 10m, 25m and 35m from the surface in September 2023. The salmon industry monitors 17 sites (since 2014) within the Harbour on a monthly basis under the Broadscale Environmental Monitoring Program (BEMP) requirements of the environmental licences.

Since the Tasmanian Government submission was finalised the EPA has deployed additional logger instrumentation within the TWWHA area. The instrumentation is sited south of Gould Point and extends data coverage along the deepest part of Macquarie Harbour. The EPA has also deployed eight additional sets of DO logger instrumentation within areas known to be preferred habitat for Maugean Skate. The DO loggers at these locations will aid in characterising changes in oxygen levels within these shallow areas of the Harbour and will continue to inform the adaptive management framework for salmonid farming within the Harbour.

Environmental licences for marine farms in Macquarie Harbour issued in November 2023 included conditions to:

1. determine the overall DO demand resulting from finfish activities;
2. implement Dissolved Oxygen Mitigation Plans to substantially offset or reduce DO demand from each lease; and
3. implement approved Water Quality Monitoring Plans to measure the success of the DO mitigation measures against the interim DGVs set by EPA.

The EPA has confirmed that the appropriate documentation has been submitted to satisfy these licence conditions with the plans now being reviewed by the EPA. These legally enforceable plans will ensure that salmon oxygen demand is offset (or

alternatively that the scale of farming is reduced) with a view to meeting the DGVs in all segments of the Harbour on an ongoing basis.

The reconsideration requests referred to the results of the CSIRO from the MHOP model which used input data from 2017 -18 which included Nitrogen inputs from salmonid farming at 38 per cent higher than current regulated levels.

The Department of Natural Resources and Environment Tasmania (NRE Tas) has re-engaged CSIRO to update and validate both the Macquarie Harbour hydrodynamic model and the dynamic oxygen process model. These models simulate the spatial and temporal evolution of sources, transformations and losses of DO from the water in Macquarie Harbour. Once they are calibrated for current inputs from salmonid farming will be able to provide more accurate forecasting of oxygen demand and recharge within the Harbour. The models' outputs will inform the accuracy and effectiveness of the industry DO demand analysis and DO mitigation plans. The models will be calibrated by December 2024 and will run updated scenarios for Macquarie Harbour in January 2025.

To strengthen the accuracy of the models, Hydro Tasmania has developed catchment inflows models for the King River and Gordon River catchments to improve the accuracy of the hydrodynamic model to predict the impacts of river flows on recharge events within the Harbour. This function, which is expected to be completed in early 2025, will enable scenario modelling to be completed to assess the role of hydropower-generated flows in facilitating oceanic recharge events within the Harbour. Hydro Tasmania has committed to reviewing the outcomes of the scenario testing to assess management options for the Gordon power station. As such, this presents another avenue of management with reasonable prospects for further improvements in DO levels beyond those described above.

### 3 Current population analysis for the Maugean skate

Current conservation and listing advice for the Maugean skate outlines that the population for the species is estimated at 40-120 mature individual females. This estimate was generated by a Population Viability Analysis (PVA) model completed in 2023 to support a revision of the listing advice for the species. Based on current demographic and life history data the model predicted the risk of extinction over three generation lengths (27 years), spanning 2014 to 2041. Key factors driving this modelled decline included low recruitment rates, habitat degradation and environmental pressures.

Recent reviews of the PVA model by the Institute for Marine Science (IMAS) and separately by Professor Barry Brook (Professor of Environmental Sustainability and ARC Laureate Fellow (2016-2021) at the University of Tasmania) have questioned the accuracy of the data used and the validity of the assumptions underpinning the model to determine the declining population trend reported. In particular, the PVA uses a matrix-based project model with environmental stochasticity. A range of sensitivities are explored for juvenile mortality, fecundity, longevity and maximum rates of population increase, although a very low population value was focused on for subsequent scenario analysis to be 'conservative'. The population trend analysis in the model is based on five catch-proportion estimates (without associated uncertainty) and two alternative exponential decline models fitted to three data points. This means that there are significant gaps in understanding the life history for the species. The reviews also determined that the rates of potential population increase, and projections used in the model, were not predictive but tuned towards a certain decline for the species.

In general, the main concerns with the current PVA model are:

1. Data selection and the discarding of data that may be useful for examining outliers. For example, including skate numbers from pre-2014 surveys (when soak times were longer) where a measure of error for Catch Per Unit Effort (CPUE) may be more informative. Additional years data (2012 to 2021) appear to have been used for smaller skate (<60cm) but not for larger skate (>60cm; 2014 to 2021).
2. Lack of reported error rates and extrapolation of data with the assumption that trends are consistent over time, sexes, size classes and the whole Harbour. For example, standard errors are not applied to the linear regression of catch proportions used to estimate population decline, available data indicates that sexes do not have the same mortality rates (Bell et al., 2016), and the data used to estimate population size may only apply to the size range of tagged animals rather than the entire population.
3. The data is skewed as a result of selective methods used to monitor the skate population which underrepresents juveniles in the population.
4. The addition of catastrophic events on top of the modelling which reduces numbers down further and is essentially 'double dipping'.
5. The PVA model assumes that conditions in the Harbour are deteriorating and are not reversible which is not supported by the current improved Harbour conditions.

To address these issues with the model NRE Tas is in the process of convening a small group of experts to repeat the modelling process using the new skate (biology, minimum population size and trend) and environmental data and revisiting assumptions about the impact (severity and trend) of threats. Importantly, the generated outputs will be more robust and there will be greater scientific consensus and confidence in model estimates.

Moreno D., and Semmens J.M. (2023) was submitted to support the reconsideration process however, IMAS has completed further CPUE surveys for the Maugean skate in Macquarie Harbour for 2023 and 2024 (refer to Moreno, D., Tracey, S. and Semmens, J. (2024). *Interim Report Number 2 – Macquarie Harbour Maugean skate population status and monitoring*, at Attachment 2), which provide critical data to inform the life history of the species and its current population and negates a number of the assumptions within the earlier report regarding population decline. Important points from the IMAS 2024 Interim Report Number 2 include:

- The 2023 and 2024 surveys generated high capture rates of skate in the Harbour with 58 and 38 individuals caught respectively. Importantly in both years juveniles were caught in the surveys to the levels recorded in the 2014 baseline year, indicating that there have been potentially two recruitment events into the population.
- That the linear regression indicating a negative slope in CPUE is strongly influenced by data collected in 2021 and 2022, where small numbers of juveniles were captured. The authors point out that the sampling methodology (gill netting) masked the presence of this juvenile cohort as it is not effective at capturing smaller sized individuals.
- The results of this year's CPUE survey are not consistent with a sustained rate of population decline. Rather the results confirm that there is an inherent high variability in CPUE data due to the methods used. The recent data are indicating that the population trend appears stable and indicates levels of recruitment and that the 47 per cent decline postulated in the Moreno D., and Semmens J.M. (2023) *Interim report - Macquarie Harbour Maugean skate population status and monitoring* is not supported. The Report notes that: "CPUE for skate less than 600mm TL now being at comparable levels to the baseline year of 2014."

IMAS intends to conduct two additional sampling events in 2024, which will strengthen the CPUE data to enable trends in abundance of the population to be calculated with greater confidence.

In addition, further analysis of the recent results provides evidence that the species appears to have a higher potential lifetime reproductive rate, and the generation length is now estimated to six years (Moreno *et al.*, *In review*), rather than nine years as was previously thought.

These results strengthen the position that the PVA driven population estimate is highly likely to be a miscalculation, and they do not support the model assumptions of total recruitment failure, or a sustained rate of population decline for the species.

The additional information provided in this addendum and its associated attachments indicate:

1. the current population figures are uncertain and are likely to be higher than previous projected estimates.
2. the population has not declined beyond 2021 levels, with an approximately level trend between 2021 and September 2024 (Moreno *et al.* 2024) indicating that the population is stable.
3. data from Lyle *et al.* (2014) suggests that CPUE across the Harbour was similar in 2012 as it was in 2021, and
4. two recent recruitment events of juveniles into the population have likely occurred.

## 4 Conclusion

The Tasmanian Government is presenting this new information as it is critical to informing the reconsideration process. This new information introduces uncertainty to causal links associated with low DO levels within the middle and lower waters within Macquarie Harbour and the life cycle and population numbers of the Maugean skate.

The data provides evidence to support the Tasmanian Government's position that the past and ongoing operations of salmonid farming within Macquarie Harbour have not had, and are unlikely to have, a significant impact on the DO within the skates' preferred habitat of shallow channels within the Harbour and, as such, are unlikely to have a significant impact on the long term population of the species.

This new evidence indicates that water quality and population numbers of Maugean skate within the Harbour can improve concurrent with salmonid farming and further supports the Tasmanian Government's submission that the existing AMF designed to monitor and sustainably manage salmonid production in the Harbour under the existing NCA-PM is fit for purpose and does not need to be revoked or substituted with an amended NCA-PM as the addition of any new controlling provisions are not warranted.

## 5 References

Lyle, J.M., Bell, J.D., Chuwen, B.M, Barrett, N., Tracey, S.R., and Buxton, C.D., (2014) Assessing the impacts of gillnetting in Tasmania: implications for by-catch and biodiversity, Institute for Marine and Antarctic Studies, University of Tasmania.

Moreno D., and Semmens J.M. (2023) Interim report - Macquarie Harbour Maugean skate population status and monitoring. Institute for Marine and Antarctic Studies, University of Tasmania.

Moreno, D., Kwan, Tze., Priest, M., Patil, J., & Semmens, J.M. (*In review*). Delineation and estimation of the Maugean skate population in Macquarie Harbour, Tasmania. National Environmental Science Program Research Report. Institute for Marine and Antarctic Studies, University of Tasmania.

## 6 Attachments

Attachment	Document
1	Macquarie Harbour Status update for dissolved oxygen, September 2024, Environment Protection Authority.
2	Moreno, D., Tracey, S. and Semmens, J. (2024). Interim Report Number 2 – Macquarie Harbour Maugean skate population status and monitoring. Institute for Marine and Antarctic Studies, University of Tasmania.





**Department of Natural Resources and Environment Tasmania**

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