

**BEFORE AN EXPERT PANEL
TARANAKI VTM**

FTAA-2503-1035

UNDER THE

FAST-TRACK APPROVALS ACT 2024

IN THE MATTER OF

an application by Trans-Tasman Resources
Limited for marine consents

**STATEMENT OF EVIDENCE OF DEANNA MARIE CLEMENT FOR THE ROYAL FOREST
AND BIRD PROTECTION SOCIETY INC**

(MARINE MAMMALS)

6 October 2025

Royal Forest and Bird Protection Society of New Zealand

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**STATEMENT OF EVIDENCE OF DEANNA MARIE CLEMENT FOR THE ROYAL
FOREST AND BIRD PROTECTION SOCIETY OF NEW ZEALAND
INCORPORATED**

INTRODUCTION

- 1 My name is Deanna Marie Clement.
- 2 I am a marine mammal ecologist at the Cawthron Institute (Cawthron) in Nelson. I have held this position for 16-years with my work focussing primarily on assessing the effects of various anthropogenic coastal projects on New Zealand marine mammals. I have worked on a variety of impact assessments and the design of several resource consent monitoring studies. Prior to my role at Cawthron, I worked in the University of Otago's Zoology Department as a teaching fellow while continuing to undertake research on marine mammals around New Zealand.
- 3 I hold the degrees of PhD in Zoology from the University of Otago, Master of Science from the Florida Institute of Technology (USA), and Bachelor of Arts (Biology) from the University of Nebraska – Lincoln (USA).
- 4 I have worked as a marine mammal scientist for almost 25 years in New Zealand and the United States. For over 20 years, one of my areas of work has been studying Hector's and Māui dolphins.
- 5 I was the lead scientist and co-author of the most recent Hector's dolphin abundance surveys in New Zealand commissioned by the Ministry for Primary Industries and Department of Conservation. The survey was the most intensive marine aerial survey ever conducted in New Zealand. The final results of this work received a landmark endorsement from the International Whaling Committee (IWC) at its annual meeting in June 2016.
- 6 My primary research interests are using remote-sensing methods (including underwater acoustics) along within spatio-temporal modelling to explore marine mammal distribution and density patterns, as well as assessing species' habitat preference, occupancy and behavioural patterns in relation to environmental and anthropogenic influences.
- 7 I have worked on a wide variety of consenting, monitoring and management issues, specialising in coastal developments and their potential effects on local New Zealand species. These projects include dredging, reclamation, port expansions, aquaculture, mining, wastewater discharges, and offshore wind.
- 8 Based on this experience, I led the development of national guidelines for minimising effects from both inshore and open ocean aquaculture on marine mammals in New Zealand with the Ministry of Primary Industries. I have also served on several multi-agency research advisory, technical and steering groups related to New Zealand marine mammals for the Department of Conservation and Ministry of Primary Industries and the USA National Oceanographic and Atmospheric Administration agency.
- 9 I have authored (and co-authored) a number of publications and articles for both academia, government agencies, private industry and public sectors. Most of my peer-reviewed journal publications have centred on Hector's dolphin. The majority of

my publications are assessment of environmental effects reports for government and commercial industries.

- 10 My more relevant publications include assessing the immediate and short-term effects of pile-driving on Hector's dolphin in Lyttelton Harbour based on 5-years of underwater acoustic monitoring ¹ and summarising stocktake information for the Ministry of Environment on underwater noise as an environmental attribute ².
- 11 Since joining Cawthron, I have prepared and presented evidence for many Environment Court hearings. This has included:
 - 11.1 On behalf of Northport Ltd. for consent for a port expansion project at Marsden Point, February 2023;
 - 11.2 On behalf of McCallum Brothers Ltd for consent of sand dredging inshore and midshore of the Mangawhai- Pakiri embayment, July 2022;
 - 11.3 On behalf of New Zealand King Salmon Company Ltd for consent to operate a new salmon farm offshore, October 2021;
 - 11.4 On behalf of Kaipara Ltd. for consent of sand dredging offshore of the Mangawhai- Pakiri embayment, February 2021;
 - 11.5 On behalf of The New Zealand Refining Company Ltd. for consent to develop its Crude Shipping Project, January 2018;
 - 11.6 On behalf of Lyttelton Port Company Ltd for consents related to Te Awaparahi Bay Reclamation Project, September and October 2017;
 - 11.7 On behalf of Lyttelton Port Company Ltd for consent to undertake its Capital Dredging Project, June 2017;
 - 11.8 On behalf of Admiralty Bay Consortium in its appeal against the Marlborough District Council for marine farm extensions, 2016;
 - 11.9 On behalf of R J Davidson Family Trust in its appeal against the Marlborough District Council for a marine farm extension in Beatrix Bay, Marlborough Sounds, 2015; and
 - 11.10 On behalf of The Astrolabe Community Trust for consent to abandon the wreck of the MV Rena and for any future discharge of contaminants from the wreck, 2015.

¹ Clement DM, Pavanato H, Lenky C, Pine MK. Immediate and short-term effects of pile-driving on Hector's dolphin in Lyttelton Harbour, Aotearoa New Zealand. *Frontiers in Marine Science*. 2025;Volume 12 - 2025.

² Clement, D. 2024. Underwater noise / ocean sound. In: Lohrer, D., et al. Information Stocktakes of Fifty-Five Environmental Attributes across Air, Soil, Terrestrial, Freshwater, Estuaries and Coastal Waters Domains. Prepared by NIWA, Manaaki Whenua Landcare Research, Cawthron Institute, and Environet Limited for the Ministry for the Environment. NIWA report no. 2024216HN (project MFE24203, June 2024). [<https://environment.govt.nz/publications/information-stocktakes-of-fifty-five-environmental-attributes>]

- 12 I note that I am providing technical expertise on my area of knowledge around New Zealand marine mammals. I acknowledge that marine mammals have a great importance to tangata whenua.

CODE OF CONDUCT

- 13 Although these proceedings are not before the Environment Court, I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (2023), and I agree to comply with it as if these proceedings were before the Court. My qualifications as an expert are set out above. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.³

SCOPE OF EVIDENCE

- 14 I have been engaged by the Royal Forest and Bird Protection Society of New Zealand Incorporated to provide expert marine mammal evidence in relation to the application lodged by Trans-Tasman Resources Limited (*TTRL*) for marine consents under the Fast-track Approvals Act 2024 (*FTAA*) and Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (*EEZ Act*).
- 15 *TTRL* seeks marine consents to extract 50 million tonnes of seabed material per year, over 20 years, mechanically recover 5 million tonnes of heavy mineral sands concentrates containing iron ore, vanadium and titanium, and return the de-ored material to the seabed (*Proposal*).
- 16 My evidence will address:
- 16.1 The existing environment as it relates to marine mammals, including gaps in the information available;
 - 16.2 The effects of the *Proposal* on marine mammals, focusing on underwater noise effects and cumulative effects;
 - 16.3 *TTRL*'s proposed effects management approach and proposed conditions related to marine mammals; and
 - 16.4 My conclusions.
- 17 In preparing this evidence I have reviewed:
- 17.1 From the *TTRL FTAA* application:
 - (a) The parts of the Taranaki VTM application relating to marine mammals;
 - (b) The proposed marine consent conditions relating to marine mammals (Attachment 1 in the *TTRL* application);

³ Out of an abundance of caution I note that Dr Simon Childerhouse (who provided evidence on behalf of *TTRL* in 2023) and I worked together at Cawthron Institute between 2019 and 2022. However, neither Dr Childerhouse nor myself worked on any *TTRL* related work during that time.

- (c) The draft Marine Mammals Management Plan (Appendix 5.9 in the TTRL application);
 - (d) Evidence of Dr Simon Childerhouse dated 19 May 2023;
 - (e) Advice note of Darran Humpheson dated 23 January 2024;
 - (f) Evidence of Darran Humpheson dated 16 February 2024;
 - (g) Rebuttal evidence of Dr Simon Childerhouse dated 23 January 2024
- 17.2 From previous TTRL hearing processes:
- (a) Evidence of Elizabeth Slooten dated 6 October 2023
 - (b) Evidence of Leigh Torres dated 6 October 2023;
- 17.3 From the fast-track application:
- (a) Affidavit of Leigh Torres dated 6 October 2025
- 17.4 To further inform my evidence, I have also reviewed the documents and publications in **Appendix 2** to my evidence, including:
- (a) Curtin University's review of underwater noise, commissioned and made publicly available by Forest & Bird New Zealand, dated 18 May 2017, and
 - (b) JASCO Applied Sciences' scientific peer review of underwater noise and marine mammals commissioned and made publicly available by the Department of Conservation, 29 August 2025

SUMMARY OF EVIDENCE

- 18 The review of data and information available on marine mammals in the South Taranaki Bight (*STB*) by the various experts involved in the Proposal for TTRL and other parties has been exhaustive over the 12 years of hearing processes for the Proposal.
- 19 Over the same period of time, a multitude of data has been gathered by other organisations and industries on those species considered most at risk in this region; pygmy blue whales and Māui / Hector's dolphins.
- 20 TTRL's assumption underpinning its Proposal application appears to be that all the necessary information to ensure adequate protection of these species against any adverse effects could be gathered once the required approvals are granted. This is a fundamental error in my opinion.
- 21 The most obvious area in which TTRL's application is deficient is the lack of information on the likely underwater noise generated by mining activities and adequate baseline data on the existing ambient underwater soundscape within and around the Proposal.
- 22 After considering the relevant proposed Conditions and management plans, it is my opinion that TTRL has failed to sufficiently address the adverse underwater noise

effects of the Proposal and protect marine mammals against underwater noise in two ways:

- 22.1 TTRL has not sufficiently demonstrated that it will have the ability to manage or mitigate underwater noise levels in case of exceedances of the Condition 11 limits. More specifically, I consider that:
- (a) As the Condition is currently written (as single numeric limits with no median allowances or rolling average), there will be frequent exceedances due to normal fluctuations in mechanical and operational activities.
 - (b) The limit also does not take into account the underwater noise generated from the other associated vessels that will be operating in the area. Consequently, it has failed to consider the actual operational effects the Proposal will have on STB's endangered and threatened species.
 - (c) TTRL has not stipulated in detail how it will reduce noise back to the required levels where exceedances of the limit occur.
- 22.2 TTRL has failed to acknowledge that the noise generated by the Proposal will significantly increase the existing average ambient soundscape (i.e. cumulative noise) within the mining area and nearby regions. Overseas regulators are currently looking to prevent or limit any increases in ambient sound levels due to the extent of chronic noise pollution already present in marine areas. More specifically, I consider that:
- (a) The Proposal will serve as a new stationary noise source generating continuous low-frequency noise within this region of the STB for 20 years. As a result, the overall average ambient sound level will increase.
 - (b) This source will be audible during low shipping traffic periods and to any animals passing near it.
 - (c) There are currently no provisions by TTRL to monitor or manage cumulative increases in the overall average ambient sound level. The only mitigation option once the Proposal commences would be to severely limit production rates to prevent cumulative increases in the overall average ambient sound levels.

THE EXISTING ENVIRONMENT AS IT RELATES TO MARINE MAMMALS

Best available information

- 23 The available data and information on marine mammals in the South Taranaki Bight (STB), including the Proposal area, has been thoroughly reviewed and discussed by the various marine mammal experts involved in the previous applications to the Environmental Protection Agency (EPA) for the Proposal.

- 23.1 In summary, the species considered regarding the Proposal include the following:

Common Name	Species Name	NZ Threat Classification ⁴	IUCN Red Listing	Residency in STB and Cook Strait waters
Pygmy blue whale	<i>Balaenoptera musculus brevicauda</i> <i>Ishihara</i>	Nationally Vulnerable	Endangered	Seasonal to year-round migrant
Māui dolphin	<i>Cephalorhynchus hectori maui</i>	Nationally Critical	Endangered	Rare nearshore visitor
Hector's dolphin	<i>Cephalorhynchus hectori hectori</i>	Nationally Vulnerable	Endangered	Nearshore resident
Common dolphin	<i>Delphinus delphis</i>	Not Threatened	Least Concern	Seasonal to year-round resident
Orca (killer whale)	<i>Orcinus orca</i>	Nationally Critical	Data Deficient	Seasonal to Infrequent Visitor
Southern right whale	<i>Eubalaena australis</i>	Nationally Increasing	Least Concern	Seasonal Migrant
Humpback whale	<i>Megaptera novaeangliae</i> <i>oceanic</i>	Migrant	Endangered	Seasonal Migrant
Minke whale	<i>Balaenoptera bonarensis</i>	Data Deficient	Near threatened	Seasonal Migrant
NZ fur seal	<i>Arctocephalus forsteri</i>	Not Threatened	Least Concern	Year-round Resident

- 24 While some experts still consider the current information on marine mammal species in the STB to be insufficient to robustly assess the potential effects of this Proposal, I am in agreement with TTRL's expert, Dr Simon Childerhouse, that the panel does not need "...perfect knowledge of all issues ... to form some reasonable conclusion about the likely impact...".⁵ It is my opinion that the level of information considered necessary by some experts is not available for most marine mammal species around New Zealand, nor is it reasonably obtainable⁶. There will always be gaps in our understanding of most marine mammal species and how they interact with their environment.
- 25 It is my opinion that the best available information regarding marine mammals in the STB has been presented and considered through the previous TTRL hearing processes, through research gathered by Dr Torres' team (for KASM) and other researchers and industries that continued to gather baseline information throughout the 12-years of TTRL's application process so far. But not all of that information

⁴ Lundquist D., Boren L., Childerhouse S., Constantine R., van Helden A., Hitchmough R., Michel P., Rayment W., Baker C.S. 2025. Conservation status of marine mammals in Aotearoa New Zealand, 2024. Report 1165. New Zealand Threat Classification System, Department of Conservation, Wellington. <https://nztns.org.nz/reports/1165> (1/10/2025)

⁵ Rebuttal evidence of Dr Simon Childerhouse dated 23 January 2024, paragraph 11.

⁶ This statement is in regard to the EEZ Act definition of best available information, as it would require unreasonably long time periods (+ 10 years) that would involve unreasonable cost and effort.

appears to have been assessed or considered by TTRL, as I discuss further in paragraphs 29-**Error! Reference source not found.**

Marine mammal presence

- 26 At present, there appears to be no general agreement on the existing environment for marine mammals. Specifically, it is TTRL's view that there is "...a low likelihood of marine mammals being present in the project area and there is nothing to suggest that the area is of any significance to any marine mammal species." ⁷ This viewpoint is contrary to most of the marine mammal experts' previous evidence (i.e. Drs Slooten, Torres and Mr van Helden).
- 27 In such cases when the effects of a novel development are unknown, I consider an appropriately conservative approach would be to assume that any of the marine mammal species that have been found or observed in the STB (past or present) could be present near the Proposal area at any point in the mining operations.
- 28 Applying such an approach for the existing environment is justified because it:
- 28.1 acknowledges the rareness and threat classification of several of the species.
 - 28.2 provide a realistic, albeit worst-case, baseline for the assessment of adverse effects on marine mammals ⁸;
 - 28.3 considers the large spatial scales over which these species currently travel / move and allows for these patterns to vary and change over the duration of the Proposal consent, and
 - 28.4 ensures more robust effects management and mitigation options are provided to manage effects on all marine mammals that may be present in the STB and come in contact with the Proposal over the duration of its consent.

Missing information on ambient soundscape

- 29 In my opinion, TTRL's application lacks critical information on the existing environment (from a marine mammal perspective) on ambient underwater sound. Based on the information submitted with the Application⁹, there has been no monitoring or sampling of the current underwater ambient (background) sound levels within or near the Proposal area by TTRL over the course of the 12 years that TTRL has been seeking to obtain approval for the Proposal.

⁷ TTRL application 2025 section 3.3.4.3, paragraph 1

⁸ I adopted this approach in evidence for the recent expansion of finfish aquaculture into open ocean, offshore areas of New Zealand. With no existing offshore farms on which to base potential effects, the marine mammal assessment for NZKS Blue Endeavour took a similar worst-case scenario approach to ensure all possible effects were considered and mitigations or management actions proactively put in place (Evidence of Deanna Clement dated 30 September 2021, U190438. The New Zealand king Salmon Co. Limited). <https://eservices.marlborough.govt.nz/download/files/Y33E6KgLBjXZY6pi28WYFqgkln8B0FLUocwD2RboHBoY>.

⁹ Table 6.1 of the TTRL Application lists an objective to "Establish background underwater noise characteristics in the vicinity of the project area prior to the commencement of iron sand extraction activities".

- 30 Any other New Zealand marine mining or dredging project (e.g. for port shipping channels to sand dredging for concrete) would be expected to provide prior knowledge and modelling of the existing soundscapes as part of a consent application. For example, considerable underwater acoustic basing monitoring and modelling was done for the various sand extraction applications off Mangawhai-Pākiri coastline¹⁰ and now under the fast-track process within nearby Bream Bay¹¹. This pre-application monitoring characterised the average ambient soundscape in the proposed extraction areas, gathered actual noise data to help inform propagation models and reviewed potential noise mitigations for sand extraction to minimise any changes to the soundscape.
- 31 Baseline monitoring of underwater soundscapes, as well as the collection of relevant habitat information (e.g. seabed bathymetry, sediment type, water temperatures), are necessary to construct realistic sound propagation models for assessing any impacts of adding anthropogenic (man-made) noise to the environment and to place these noise effects in context of the existing soundscape.
- 32 Given the abundance of literature on the various effects of anthropogenic underwater noise on marine mammals from other offshore industries (e.g. oil, wind farms), I would expect TTRL to have, at the least, undertaken initial measurements of ambient underwater sound given the STB region has not been previously studied acoustically. The technology and capability to undertake long term, fine scale (i.e. continuous 24 hour) underwater acoustic monitoring of deeper waters around New Zealand has been available for over a decade. Such monitoring can be done over the course of a year with relatively simple equipment (single moored hydrophone) and in a way that is reasonably cost-effective as evident by Dr Torres and her students, the University of Auckland's work within the Hauraki Gulf ¹², Cawthron's work with various New Zealand industry and ports including Northport Container Terminal Expansion - fast track listed project ¹³.
- 33 I would also have expected TTRL to make use of the underwater acoustic monitoring that Dr Victoria Warren (University of Auckland / NIWA at the time) or Dr Torres and her research lab collected starting in 2016 (e.g. Warren et al. 2021a, 2021b; Barlow et al. 2022, 2023). These studies would be able to provide at least some baseline data for TTRL to categorise the existing ambient underwater sound levels and begin building an applicable propagation model of the Proposal's soundscape. In addition, these studies also provide data on noise contributions from other anthropogenic sources in the STB that could be used to model cumulative noise effects.

¹⁰ McCallum Bros Limited – Auckland Council consent of sand dredging in the inshore and mid-shore regions of the the Mangawhai- Pakiri embayment, August 2022; later Environment Court hearing for offshore sand extraction (NZEnvC 072)

¹¹ <https://mccallumbros.co.nz/summary-of-the-assessment-of-underwater-noise/>

Part of fast-track listed project - Bream Bay Sand Extraction Project - Mineral sand extraction across 17km² of seabed at Bream Bay (<https://www.fasttrack.govt.nz/projects/bream-bay-sand-extraction-project>).

¹² <https://www.auckland.ac.nz/en/news/2023/05/24/sound-pollution.html>
<https://www.auckland.ac.nz/en/news/2021/07/21/lockdown--when-the-ocean-went-quiet.html>

¹³ Examples include: 1) Fast-track project - Northport Container Terminal Expansion - Expand the existing port facility, including reclaiming coastal marine area for a new berth and container terminal, wharf extension, capital dredging, and associated maintenance dredging.

- 34 The lack of any sound sampling or monitoring by TTRL is concerning given this Proposal involves a mining method that is new to New Zealand waters as well as internationally. Without baseline underwater acoustic information, it is extremely difficult to properly assess the full range of potential adverse effects that this Proposal could create for marine mammal species that rely on sound for their primary sense.

EFFECTS OF THE PROPOSAL ON MARINE MAMMALS

- 35 I agree the main effects of the Proposal on marine mammals (as discussed in the TTRL application) would arise from:

35.1 Underwater noise and vibration;

35.2 Vessel collision;

35.3 Gear entanglement;

35.4 Spills; and

35.5 Sediment plumes.

Vessel collision, gear entanglement, spill and sediment plume effects

- 36 It is my opinion, based on previous consent experiences and the evidence and conditions in this case, that the Proposal presents a relatively low risk to marine mammals in relation to vessel collision or gear entanglement, vessel or gear spills, and sediment plume impacts. I consider the conditions proposed by TTRL will adequately manage those risks.

Underwater noise and vibration effects

Context

- 37 The ocean is an environment filled with noise - from natural sources (i.e. under sea volcanoes), climatic events (i.e. waves, rain, wind) and marine fauna (including marine mammals) undertaking every day biological activities (i.e. communication, navigation, foraging). Marine mammals have evolved specifically to use underwater noise as their primary sense for all aspects of their lives.
- 38 Marine mammals passing through the Proposal area and the wider STB / Cook Strait region are exposed to a variety of natural noise sources (geological and biological) and anthropogenic activities that generate underwater noise. These species likely cope with most naturally occurring large, but short duration variations in ambient (background) noise levels, such as earthquakes (e.g. Barlow et al. 2022).
- 39 However, elevated ambient (or background) noise levels, caused by an increase in anthropogenically generated noise, can prevent or interfere with the detection of sounds and be a hinderance for marine mammals that are reliant on sound for survival. For marine mammals, adverse effects associated with increases in underwater noise include reduced detection, behavioural responses (e.g. changes in surfacing or diving patterns), auditory masking (e.g. interruptions in type or timing of vocalisations), auditory stress (referred to as temporary threshold shift or TTS) and possible auditory injury (referred to as a permanent threshold shift or PTS).

- 40 Recent research¹⁴ suggests that chronic noise effects, also known as underwater noise pollution, are the greater impact (compared to acute noise effects) as they can lead to negative consequences for whole ecosystems. International organisations, industries and regulatory agencies around the world now recognise anthropogenic underwater noise as a concern (e.g. European Commission 2017; CEDA 2011, WODA 2013).

Noise levels from the Proposal

- 41 TTRL's predicted sound levels from the Proposal consider only the operations of the Integrated Mining Vessel (IMV) and seabed crawler, estimating 177 dB re 1µPa @ 1m , or the equivalent noise levels to a medium sized ship (albeit a stationary ship rather than transiting one). Based on these predicted noise levels, TTRL would be able to meet its proposed Condition 11(c) limiting combined noise levels to 135 dB re 1µPa RMS or below at 500m from the active mining area.
- 42 Yet, TTRL has not sufficiently demonstrated that it has the ability to manage or mitigate underwater noise levels that have the potential to cause behavioural disturbance, physically stress (TTS) or injury the hearing (PTS) of nearby marine mammals if they exceed Condition 11 limits.
- 43 Based on the Proposal operations, as described in TTRL application and for reasons outlined below, it is highly likely that once operations have commenced and the *in situ* noise levels of active mining by the IMV and crawler are measured, they will be louder than TTRL's predicted levels despite proposed Conditions 13 and 14 certification and testing processes.
- 43.1 The propagation model and noise level predictions are not based on any baseline ambient data collected from STB nor any *in situ* noise levels estimates from the actual mining operations as proposed since there are currently no internationally comparable operations.
- 43.2 The IMV itself will be using its position-keeping system known as Thruster Assisted Mooring (TAM), which consists of six underwater thrusters, in addition to anchor cable winches, all of which will be constantly working (i.e. generating continuous underwater noise) to keep the ship in position above the crawler when actively mining.

¹⁴ Duarte CM, Chapuis L, Collin SP, Costa DP, Devassy RP, Eguiluz VM, et al. 2021. The soundscape of the Anthropocene ocean. *Science* 371(6529). DOI:10.1126/science.aba4658. Merchant ND, Putland RL, André M, Baudin E, Felli M, Slabbekoorn H, Dekeling R. 2022. A decade of underwater noise research in support of the European Marine Strategy Framework Directive. *Ocean Coast Manag.* 2022 Sep 1;228:None. doi: 10.1016/j.ocecoaman.2022.106299. PMID: 36133796; PMCID: PMC9472084.

- 43.3 As has been identified in the noise reviews provided by Curtin University¹⁵ and JASCO¹⁶ experts, TTRL should have assessed all the anticipated noise sources together under several different operational scenarios.
- 43.4 There will be large portions of time in which several other vessels (e.g. anchor handling tugs and floating storage and offloading vessel) will be operating around and in the vicinity of the IMV. These vessels will increase the overall noise levels well past TTRL's predicted limits when they are present (the level of which will depend on their make, size, age and purpose).
- 43.5 There is a high likelihood of exceedance, given that the limits are a single numeric value (not a rolling average or median value).
- 44 I consider these effects will be less than minor to more than minor as described in **Appendix 1**.
- 45 As a result, the noise limits of Condition 11(c) will likely be violated frequently, exposing marine mammals to behavioural disturbance effects at much greater distances (10s of kilometres) than predicted and creating a potential for nearby animals to be at risk of hearing impairment (TTS) or injury (PTS) (summarised further in **Appendix 1**). Hence, I do not consider the proposed Conditions 11 to 14 adequately address the Proposal's underwater noise effects on marine mammals

Lack of consideration for cumulative noise effects

- 46 The existing STB sound environment includes anthropogenic noise from large-scale commercial shipping, cruise vessels and private boating as well as the commercial fishing fleet. There has also been significant oil and gas exploration and development in this region for several decades, and on-going production within at least six drill sites, one of which is in the area proposed for mining.
- 47 Cumulative noise generated by multiple activities (natural and anthropogenic) within proximity of each other and the wider region is not always additive (i.e. twice as loud when combined). Instead, often the 'loudest' source will be detected above most other noises, or depending on similar noise sources, will merely cover up or mask the other sources rather than the sources simply adding together to make the environment twice as noisy.
- 48 As such, the average ambient sound level for STB will be influenced by the 'noisiest' vessels passing through as well as the overall number of vessels. As a result, an additional medium-sized container vessel would be unlikely to change the average ambient sound level in the presence of larger vessels when transiting through the STB at the same time.

¹⁵ Duncan A, McCauley R, Erbe C. 2017. Assessment of: A) Predicted underwater sound impacts on marine mammal in sand mining area and recommendations, B) Review of modelling of underwater noise from the proposed Trans-Tasman Resources Ltd iron sands extraction operation carried out by AECOM. CMST Project 1504, Report 2017-08. Prepared for Forest & Bird. 18 May 2017. (Included in Appendix 2)

¹⁶ Jolliffe, C., C. McPherson, and V. Warren. 2025. Trans-Tasman Resources Limited's Fast-Track Application - Taranaki VTM, 2025: Scientific Peer Review in Relation to Underwater Noise and Marine Mammals. Document 03969, Version 1.0. Technical report by JASCO Applied Sciences for Department of Conservation | Te Papa Atawhai, New Zealand. (Included in Appendix 2)

- 49 This also means that if a group of marine mammals was within the audibility range of this additional medium-sized vessel, they would be able to hear it until one of the 'louder' commercial vessels passed within their hearing range. At this point, the animals would only hear the louder (and likely closest) of the two sources, but only while they remained within audibility range.
- 50 As noted in above, the IMV and crawler (and associated vessels) will remain on station and mining continuously in the Proposal area throughout the duration of the mining activity (20 years). If the same group of marine mammals was within the audibility range of the Proposal and a commercial vessel passed nearby, the animals would again hear the louder (and likely closest) of the two sources over the other source (i.e. based on the predicted sound levels for the TTRL activities being equivalent to a medium sized vessel- paragraph 41).
- 51 However, shipping traffic represents a temporary and moving noise source that eventually leave the STB. The TTRL mining activities will be a stationary point source that will generate continuous underwater noise from its respective area for the duration of its consent (20 years). As such, TTRL's activity will become the 'noisiest' source in this region of the STB, once larger vessels are out of audible range and during low traffic periods, and it will be a constant noise source.
- 52 As a result, the ambient noise level in the audibility range of the Proposal will be changed due to TTRL activities and lead to an overall increase in the existing average ambient noise levels over time. As decibels work on a logarithmic scale, an increase of just 1dB equates to 10 times more noise.
- 53 I consider this effect will be more than minor to significant as set out in **Appendix 1**.
- 54 Any increase above normal ambient levels, also known as chronic noise pollution, can affect individual animals (e.g. larvae, fish, mammals), noise sensitive species as well as the health of whole ecosystems (e.g. Duarte et al. 2021, Merchant et al. 2022).
- 55 Hence, why it is so critical for TTRL to have collected baseline data on the STB's average ambient soundscape in the Proposal area and affected regions.
- 56 With this information, several difference scenarios could be modelled to assess how a range of predicted noise levels generated from the Proposal could affect the average ambient soundscape across different cumulative settings (e.g. busy shipping periods, during storms, blue whale foraging season). We need to understand how the underwater noise generated by the Proposal may spread differently into the shallower waters towards shore (within the CMA) than towards the shelf and deeper waters (within the EEZ) in these different settings to better predict and mitigate the risks of chronic noise pollution.

EFFECTS MANAGEMENT AND CONDITIONS

Management of noise effects

- 57 TTRL has proposed a range of conditions relevant to marine mammals and noise including 10 - 18, 35, 66, and 88. Other than the limits discussed above and in relation to Condition 11-14, the remaining conditions simply advocate for monitoring with no obvious reasons or actions tied to the results of this monitoring.

- 58 More specifically, the conditions and draft management plans do not address what will happen when the proposed noise threshold limits are exceeded nor give any details as to how they might reduce them.
- 59 As the majority of noise will likely be generated from the IMV, crawler and associated vessels, reductions can only happen by reducing the power or size of these vessels or through the use of innovative engine quieting technology. Several international initiatives are forcing rapid developments towards quieter, more efficient propulsion technology such as electric or hybrid systems for new ships (e.g. IMO 2023).
- 60 The use of such noise reduction technologies by TTRL would be a step in the right direction. However, regardless of meeting Conditions 13 and 14 assurances around compliance with Condition 12, the actual operational activities and associated vessels (see para. 43) will inevitably lead to exceedances of Condition 11.
- 61 I am concerned about these gaps in the conditions, as there are limited management or mitigation options available to TTRL to reduce noise once the Proposal's operation has commenced. Once these ships are purpose-built for TTRL and have commenced mining operations, only minor adjustments can be made to their operational systems, which in my experience are highly unlikely to result in any substantial reductions in underwater noise levels.
- 62 The only option to adequately mitigate the effects at that point would be to severely limit the amount of mining to only occur in certain conditions (e.g. when there are no other vessels associated with the Proposal operating in the area) or time / volume limits to maintain the Condition 11 threshold.
- 63 It is my view, as the proposed conditions and plans stand, there is a high risk that Condition 11 is unattainable in its current form.
- 64 In terms of those proposed Conditions 11, 15-18 that address measuring and monitoring noise, I defer to the more thorough review by JASCO (Section 2.8; Jolliffe et al. 2025). This review specifically addresses several relevant standards and best practices for underwater noise that have not been considered or followed by TTRL, particularly the ISO standards.

Management of cumulative noise

- 65 There is also no condition requiring TTRL to demonstrate that the Proposal will not increase overall average ambient noise levels in the Proposal area.
- 66 New Zealand currently has no national guidelines or standards used for underwater noise. Instead, most marine development projects in New Zealand are voluntarily adhering to standards from overseas¹⁷. The European Commission is the only international regulatory agency to currently have a standard to maintain or reduce underwater noise pollution levels (i.e. chronic and cumulative noise; Merchant et al. 2015, 2022).

¹⁷ For example, port infrastructure projects often use the United States' NMFS (2024) standards for pile-driving and construction activities as part of their resource consent condition requirements. This includes Lyttelton Port Company, NorthPort, Port of Marlborough (Picton), and Centre Port (Wellington).

- 67 Annual average sound pressure levels are proposed to be considered against a representative condition (i.e. 'good noise' year based on long-term data or in this case, existing ambient soundscape) for a particular area (i.e. STB). A preliminary indicator for this initiative aims at tracking low frequency ambient noise level using annual average sound levels across three different frequency bands (63Hz, 125Hz and 2000Hz bands) within a specified affected area (Merchant et al. 2022, HELCOM 2023).
- 68 It is my opinion that a condition is needed that requires TTRL to maintain the average ambient noise at an agreed upon level at or near the current existing state (e.g. <1dB). There are currently similar discussions around the protection of ambient soundscapes and cumulative noise effects underway and involving sand dredging activities in New Zealand ¹⁸.
- 69 In the case of cumulative noise effects and as noted above, there are currently few management or mitigation options for TTRL to reduce its noise levels once mining operations commence.
- 70 The only option in my opinion to avoid increasing the overall average ambient noise level, and adversely affecting the ecosystem, is to severely limit the amount of mining that is allowed on a daily, weekly or seasonal basis in order to maintain the average ambient noise at an agreed upon level at or near the current existing state and as specified in a condition (e.g. <1dB).

Monitoring

- 71 TTR has also provided a draft Marine Mammal Management Plan and draft Marine Mammal Monitoring Plan¹⁹ with the Application. This plan is largely focused around detecting ship collisions and entanglement with multiple methods for monitoring the immediate area around the Proposal for marine mammals.
- 72 The only proposed management measures involve soft-starts (standard practice for pile-driving activities) will be implemented and audited. My understanding is that the mining operations once started, will run continuously. Hence, there will be few opportunities for these protective measures to be used in this project.
- 73 Based on my previous experience with long-term monitoring for effects on marine mammal presence and distribution (e.g. Clement et al. 2022), it will be extremely difficult to assess and isolate the direct or indirect effects of the Proposal on marine mammals alone or in combination with other natural drivers and anthropogenic activities in the STB, even with a comprehensive multi-decade research monitoring programme.
- 74 In particular, any references to monitoring abundance within the monitoring area are unrealistic. If sightings within the proposal area are as low as the Application ascertains, any abundance analyses (regardless of method) will be dealing with low sample sizes resulting in estimates with very wide confidence intervals. This means

¹⁸ Fast-track project - Bream Bay Sand Extraction Project - Mineral sand extraction across 17km² of seabed at Bream Bay (<https://www.fasttrack.govt.nz/projects/bream-bay-sand-extraction-project>).

¹⁹ https://www.fasttrack.govt.nz/__data/assets/pdf_file/0014/4343/Taranaki-VTM-FTA-Application-Appendix-Section-5.pdf

experts will not be able to statistically determine any significant changes or trends to species abundance through time.

- 75 Instead, if the intent of the monitoring is to understand how the mining activities might be affecting local populations within the STB (such as pygmy blue whales), then the more appropriate approach would be to study these population closely. Given the research to date undertaken by Dr Torres and others, such a monitoring approach is more likely to have the statistical power to detect any changes in the population discussed in the plan.
- 76 As the proposed monitoring and management plan stand, these measures will do little to properly assess or help mitigate the potentially significant risk of underwater noise effects on local endangered and threatened species, and there will be little to no options to reduce these adverse effects once operations begin.

CONCLUSIONS

- 77 After considering TTRL's application, proposed conditions and draft management plan, it is my opinion that TTRL has failed to adequately address the adverse underwater noise effects of the Proposal and not acknowledged the importance of the STB soundscape for several endangered and threatened species of marine mammals. Hence, the Proposal does not appropriately protect marine mammals in two ways:
- 77.1 While TTRL has included the Conditions 11 and 12 limits, it has not demonstrated that they are achievable and has not proposed any measures to mitigate or reduce underwater noise levels when exceedances of the limits occur; and
- 77.2 There are no provisions to monitor or prevent cumulative increases in the overall average ambient sound level within the Proposal area and affected regions of the STB, an effect that will not only adversely affect marine mammals but the ecosystem as a whole.



Deanna Clement
6 October 2025

APPENDIX 1 - SUMMARY OF POTENTIAL EFFECTS ON THE RELEVANT MARINE MAMMAL SPECIES FROM THE PROPOSED TTRL ACTIVITIES

Potential adverse effects / TTRL Activity	Spatial scale of effect on marine mammals	Persistence / duration of effect for marine mammals	Consequences for marine mammals	Likelihood of effect	Significance Level of Effect	Potential management / mitigation options
Behavioural and / or physical responses to Underwater noise of mining operations #						
Physical injury (TTS / PTS)	Medium to Large - IMV + crawler only = up to 500m - IMV + crawler + other operational vessels = >500m	Persistent - continuous noise will persist for life of the consent – 20 years - exposure variable depending on operational stages, distance to source and hearing recovery periods (no noise)	Individual to Regional Level - hearing impairment or injury of threatened / endangered individual (i.e. breeding female), - hearing impairment or injury of non-threatened dolphin or pinniped - potential attraction of juvenile animals	Low to Moderate - PTS to TTS	Less than Minor to More than Minor	- Real-time, <i>In situ</i> monitoring of potential underwater noise level exceedances from mining activities - Requirement to adjust mining volumes / intensity as necessary to remain below noise limits - Regular maintenance and upkeep of all vessel and mining gear and equipment - Reduce unexpected noise changes by using ramping up procedures in any processing or production operations on the IMV

Potential adverse effects / TTRL Activity	Spatial scale of effect on marine mammals	Persistence / duration of effect for marine mammals	Consequences for marine mammals	Likelihood of effect	Significance Level of Effect	Potential management / mitigation options
Cumulative underwater noise (ambient noise levels) #	Medium to Large - behavioural responses / masking effects at 10s of kilometres	Persistent - continuous noise will persist for life of the consent – 20 years - chronic exposure will vary depending on distance to source, ambient soundscape and presence of other noise sources (e.g. other ships)	Individual to Population Level - individuals avoid or approach activities, exhibit a range of behavioural responses - potential regional abandonment or avoidance of Proposal area or STB by age groups (e.g. mother / calves) or sensitive individuals - possible acoustic masking of communication between population conspecifics within STB	Moderate to High - behavioural avoidance / attraction - masking effects	More than Minor to Significant	Severely limit the amount of mining that is allowed on a daily, weekly or seasonal basis in order to maintain the average ambient noise at an agreed upon level at or near the current existing state

TTS = temporary auditory threshold shift.
PTS = permanent auditory threshold shift.

Definition of terms used in Appendix 1:

- Spatial scale of effect: Small (tens of metres), Medium (hundreds of metres), Large (> 1 km)
- Persistence of effect: Short (days to weeks), Moderate (weeks to months), Persistent (years or more)
- Consequence: Individual, Regional, Population level
- Likelihood of effect: Not Applicable (NA), Low (< 25%), Moderate (25–75%), High (> 75%)
- Significance level: Nil (no effects at all), Negligible (effect too small to be discernible or of concern), Less than Minor (discernible effect but too small to affect others), Minor (noticeable but will not cause any significant adverse effects), More than Minor (noticeable that may cause adverse impact but could be mitigated), Significant (noticeable and will have serious adverse impact but could be potential for mitigation).

See explanation of effects below

Explanation of effects in Appendix 1

Note the range of significance of effect column is dependent mostly on the findings in the consequence and likelihood of occurrence columns.

Operational noise effects

It is not possible to make any good predictions of effects without actual noise measurements (from full operations and background noise) and the effect distance will differ between species due to their different hearing abilities (whales hear very long distance with low frequency - what we expect to have with mining). Hence, why this effect varies in its significance.

For example, a small group of common dolphins may wander close to the proposal and experience TTS. This effect will only have consequences for that small group that could range from low or moderate (depending on how long they stayed in area) but will disappear once that have travelled past and out of the region (Less than Minor).

But it could be More than Minor (noticeable that may cause adverse impact but could be mitigated) if it is a group of blue whales that are experiencing TTS while trying to locate krill / foraging grounds, as this is hamper their ability to feed and such as effect would be at the regional level.

Cumulative underwater noise (ambient noise levels)

Measurements are required to determine when (distance) reactions to noise are expected. However, these effects are context-, species- and individual-dependent. A human analogue would be the reactions of a toddler, teenager and adult to a really loud heavy metal rock concert - all likely different behaviourally but at some loudness level (injury), their hearing would all be affected similarly.

For example, blue whales come into forage and experience much louder background noise than previous visits (i.e. analogue living near rural road vs next to highway). While they would stay in STB, they might not stay and forage for as long as they'd like or they might not explore into the eastern part of STB because of new noise. They might also find it harder to communicate with their calf or others in the region. This effect is more at the regional level now (more than minor) and if then next year, they stop in STB and decide it is still too noisy and therefore move on, that will be population level and getting to the significant effect stage (noticeable and will have a serious adverse impact but could be potential for mitigation).

There is not a lot of good data for marine mammals on such levels because there are such mixed behavioural reactions from the little data available.

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