BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY
AT WELLINGTON

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (**EEZ Act**)
AND	
IN THE MATTER	of an application for marine consent under section 38 of the EEZ Act by Trans-Tasman Resources Limited to undertake iron ore and processing operations offshore in the South Taranaki Bight
BETWEEN	**Trans-Tasman Resources Limited** Applicant
AND	**Environmental Protection Authority** EPA

EXPERT EVIDENCE OF DONALD ALLAN ROBERTSON ON COMMERCIAL FISHERIES MATTERS AS REQUESTED BY THE EPA FOR THE DMC
Dated: 21 February 2017

Qualifications and experience

1. My name is Donald Allan Robertson. I have a BSc Honours (1969) in Zoology and a PhD (1973) in Marine Biology both from the University of Otago. I have a background of 40 years in marine resource science for sustainability, fisheries science & management, marine ecology, biodiversity, biosecurity, data/information management, research leadership, financial planning, project management. I have published 54 refereed papers, >63 reports and presented numerous conference papers. I have developed research facilities, large projects, resource management options, policy advice, strategic planning – in & around the New Zealand EEZ, Antarctica & Southern Ocean. I have held senior management roles in NZ Ministry of Agriculture & Fisheries & NZ National Institute of Water & Atmospheric Research Ltd (NIWA), including NIWA Vessels Ltd. I served as the NZ Governing Board member on Global Biodiversity Information Facility. My experience includes operational and governance roles with the Antarctic Treaty Nations Scientific Committee and Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR); I was Vice-Chair of the Scientific Committee for CAMLR for 2 years, NZ representative and Head of Delegation on the Scientific Committee and a member of the NZ delegation for the Commission for CAMLR for 15 years. In 2014 -15 I was a committee member on the Environmental Protection Authority OMVMaari Decision Making Committee.

Code of Conduct

2. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note dated 1 December 2014. I agree to comply with this Code. 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 that I express.

Scope of Brief

3. My instructions from the EPA were to review the Fathom Report, fisheries evidence of the applicant and submitters, and key fisheries submissions to provide the DMC with fisheries expert advice.

   The review of the Fathom Report should:

   a) Identify if there are any gaps in information, and

   b) comment on any issues arising from the age of the data it is using and hence the conclusions it reaches, and

   c) provide advice on submitter concerns about this report.

Nine submissions or items of evidence are reviewed and commented on. These are listed in paragraph 96.

Review of Fathom Consulting Report

4. The following paragraphs 5-26 review the "South Taranaki Bight iron sand mining proposal – Assessment of potential impacts on commercial fishing. Prepared by Nici Gibbs, Fathom Consulting Ltd for Trans-Tasman Resources Ltd Final: 5 July 2013".

5. I found this report to be well written, well considered, balanced and credible. The first question that might be asked is whether the fact that the Fathom Report was prepared in July 2013 is likely to be a significant issue. That is, has the information become dated because of potential changes in commercial activity in the area under consideration since 2013? This question was kept in mind during this review.

6. Nici Gibbs, Fathom Report author states that she reviewed additional scientific work commissioned by TTR since 2014, and states that as of November 2015, her 2013 report conclusions "remain valid".

7. In her executive summary, Ms Gibbs states that "*during the mining operation, commercial fishing will be excluded from the active mining block – an area of approximately 3.7 km by 4 km – and may be further restricted by the location and movements of mining vessels*".

8. Ms Gibbs continues with a broad summary statement that seems to me to be a fair and reasonable summary of the potentially impacted fisheries: "*The main commercial fisheries in the immediate area of the mining operation are a mixed bottom trawl fishery for trevally, leatherjacket, gurnard and snapper, and a set net fishery targeting school shark, rig and blue warehou. Nearby fisheries include a coastal rock lobster fishery and, on the seaward side of the mining site, a mid-water trawl fishery for jack mackerel and a small bottom longline fishery*".

9. It is quite possible however, that in the bottom trawl fishery referred to here that since the most recent year (2013) of catch data referred to by Ms Gibbs, the list of main species caught could have changed slightly and/or the relative proportions of the same list of species could have changed. Any change over the period 2013 -2016 though would not alter the nature of her conclusions except for the commercial species mix or their relative abundance. These natural changes may be similar to changes that could occur during mining, but may or may not be caused by mining activity. If such changes were observed

during fishing near the mining activity or observed in surveys in or near the mining area there could be some difficulty in attributing the changes to mining. The findings on the characteristics of the STB commercial fisheries and potential mining impacts in the Fathom Report are superceded by but generally consistent with the two NIWA Reports 17 and 18.

10. I agree with the point made in the remainder of the Executive Summary in Ms Gibbs Fathom Report under the heading "*Potential impacts on commercial fishing*" that "*As the amount of displaced catch in both the trawl and set net fisheries will be small, it is unlikely that there will be any wider negative impacts on the commercial fishing industry – in particular, no negative impacts on quota value, downstream businesses, or fish stock sustainability are anticipated as a consequence of spatial displacement*. These conclusions are consistent with and superceded by findings in the two NIWA Reports 17 and 18.

11. It should be kept in mind during consideration of potential effects of TTR mining on commercial fishing that the actual area of mining is very small in relation to the likely areas to be fished in the STB. It should also be kept in mind that as a consequence of this very small areal scale of mining activity, the scale of fishing activity and resulting catch that might otherwise have taken place in the locality excluded by mining would also be very small. Further, the number of the main commercially targeted trawled fish species is also small (~5) and includes species that in this region are not known to form large localised aggregations but are often more widespread and dispersed. The area affected by the sediment plume expands the area of potential displacement.

12. Comment on Section 1.2: "*The Quota Management System*". This is more for background understanding than for assessment of TTR mining impact on commercial fisheries but has some relevance in outlining how any larger impact caused by activities such as TTR's might be expressed in terms of tradeable value of ITQ and/or ACE, and in assessing any economic impact on commercial fisheries. My reasons for not being concerned by this are outlined below on page 4 (paragraph 23).

13. Comment on Section 2: "*Fishing Methods*" summarises NIWA's (pre Report 18) findings on fishing methods in the proposed mining area.

14. Comment on an extract from Section 2.2.1 (page 11 in the Fathom Report) follows: "*In a characterisation of FMA 8 fisheries prepared for the Challenger Finfish Management Company, five distinct inshore trawl fisheries were identified within FMA 8, of which the following three occur at least in part within the South Taranaki Bight:*

- *a trawl fishery targeting snapper, red gurnard and trevally. This fishery is primarily located north of New Plymouth with only a small proportion of effort in the South Taranaki Bight. The associated non-target catch is comprised of a large number of species, most notably barracouta, leatherjacket, kahawai and John dory;*
- *an inshore barracouta trawl fishery in the South Taranaki Bight, operating in depths of 40m to 80m, with a significant catch of leatherjackets; and*
- *a trawl fishery in the south of FMA 8, operating in the 30m to 80m depth range, principally targeting red gurnard and, to a lesser extent, flatfish. Most of the fishing effort occurs off the Kapiti/ Horowhenua coast although some fishing trips do extend into the South Taranaki Bight. Non-target species caught in this fishery include leatherjacket, barracouta, trevally, snapper and red cod*."

15. The significance of these statements is that they emphasise the relatively small scale of targeted bottom trawl fishing activity which takes place in the whole of the STB. This is consistent with the findings in TTR NIWA Reports 17 & 18.

16. These points are further emphasised in the following statements in Section 2.2.1 on page 12 of the Fathom Report: "*According to NIWA, species commonly targeted in the South Taranaki Bight trawl fishery are red gurnard, tarakihi, trevally, barracouta, warehou (two species), flatfish (several species), leatherjacket, John dory and snapper. Fishing industry sources suggest that the main species targeted in the direct area of interest for mining are trevally and leatherjacket, with some gurnard, John dory and flatfish. In addition to the main trawl target species identified above, a range of other species is taken as bycatch, including species such as rig and school shark that are also targeted by set netters*."

17. In these statements, NIWA lists 9 quota species categories as targeted, while fishing industry sources list 2 "*main species targeted*" with some targeted catch of 3 other species, in the "*area of interest for mining*". This also indicates some apparent subjectivity in determining what is a "target" species in a particular situation.

18. Comment on Sections 2.2.2 and 2.2.3: these sections on set netting and line fisheries are fair and reasonable and reinforce the theme of minimal spatial impact by proposed mining expected on these fisheries.

19. For longlining (Section 2.2.3, page 17) the Fathom report concludes negligible overlap with the mining area. "*The 2011 characterisation of FMA 8 fisheries identifies three distinct line fisheries (bottom longline and dropline) in FMA 8, none of which appear to have any significant spatial overlap with the area of mining interest. The three identified line fisheries are:*
    - *A school shark line fishery, operating primarily in the southern part of FMA 8 in the 80-200 m depth range;*
    - *a hapuku line fishery operating exclusively in the southern (Kapiti) area of FMA 8; and*

- *the bluenose bottom longline fishery, also associated with hapuku, operating along the edge of the continental shelf in the 150-600m depth range*."

I agree with the assertion that there is not likely to be any significant overlap with the proposed mining area. This is consistent with NIWA Reports 17 and 18.

20. Comment on Section 2.2.4: this section briefly discusses midwater trawling and states (page 18) that "*there is unlikely to be significant spatial overlap between the midwater trawl fishery and the area of interest for sand mining*." I agree with this statement. This is also consistent with NIWA Reports 17 and 18.

21. Comment on Section 2.2.5: This section on rock lobster potting concludes reasonably that "*Rock lobster potting takes place in coastal waters with no direct spatial overlap with the proposed mining operation.*" I agree with this statement.

22. The Fathom report concludes (page 26) that *"Any effort and catch displaced from the trawl fishery as a result of the mining operation is likely to be minimal, and is unlikely to result in any wider negative impacts on commercial fishing or fisheries. Displaced catch can be caught elsewhere in the FMA with minimal, if any, increase in the overall cost of fishing. However, costs for the New Plymouth-based trawl operator may increase if this fisher moves any displaced effort to areas where snapper are more abundant.*"

23. Thus (in the previous sentence) and in section 3.1.3 on set net fisheries, the main spatial impact on fishing, while expected to be very small, is that fishers may experience a mis-match between the species mix in their Annual Catch Entitlement (ACE) holdings and the species mix in their trawl catches through slight locality displacement necessary to avoid the mining site, and fish elsewhere in FMA 8. However while these issues may be made slightly more inconvenient by a very small spatial exclusion from a mining area, such a balancing act (between ITQ/ACE species mix and catch species mix) is an ongoing challenge in the normal course of each years fishing activity. This is because fishers often experience variation in species catch mix. This can vary from one locality to another and from year to year, and has been a challenge which has had to be managed since the advent of the QMS. While there can be occasional quota/ACE species mix supply/demand/price issues over availability of particular species-area amounts, this is a normal fact of commercial fishing life.

24. Comment on Section 3.2 (page 31): This section of the Fathom report considers the indirect effects on abundance and distribution of commercial fish species. Consideration of abundance is brief and relies on a NIWA (2012) report for TTR and which concluded (section 3.2.1):

- "*deaths of demersal and pelagic fish species caused directly by the iron sand extraction process are unlikely; and*
- *the use of seawater to pump iron sands to the processing vessel is likely to have negligible effects on larvae of fish species or their planktonic prey.*

The sand mining operation is therefore unlikely to affect the abundance of commercially fished species in the immediate area." I agree with this conclusion.

25. Comment on Section 3.3.2 of the Fathom report: this section addresses "*Offsite impacts on coastal reef fisheries*". This section considers sediment reaching rocky reef areas and its potential effects on rock lobster, the main commercial species in this habitat. It does not consider amounts or types of sediment, nor its persistence, nor its scale relative to the amount of normal (non-mining sourced) sediment mobilised by large swells or rough seas during strong winds in rough weather events. The conclusions in this section are drawn from a NIWA report which states that while adult rock lobster could migrate away from a sediment deposition event, smaller less mobile juveniles might be impacted; and rock lobster might be affected if their prey species were impacted. I agree with these points.

26. Returning to my question at the outset (in my paragraph 5) as to whether the conclusions in the Fathom Report are weakened by its time series of background fisheries catch data stopping at 30 September 2013, I suggest that the conclusions are as relevant as if the remaining available two years of catch-effort data had been included in a revised version of the report. Any gap resulting from the time covered by the Fathom Report (the gap between 1 October 2013 and 30 September 2015) is well covered by the more recent Report 18: South Taranaki Bight Commercial Fisheries 1 October 2006 – 30 September 2015 *Prepared for Trans-Tasman Resources Ltd May 2016 by MacDiarmid & Ballara.* Report 18 includes all relevant available catch effort data (up to 30 September 2015). Conclusions in the Fathom Report are not inconsistent with those in Report 18.

27. Dr Helson in his submission states "*The Fathom Report has not been relied upon in the Applicant's evidence with the NIWA analysis of May 2016 superseding both*". (See further comments in the review of Dr Helson's submission below). In my opinion the Fathom Report contains some useful information and need not be rejected.

Review of Expert Evidence of Alison MacDiarmid on Behalf of TTR Ltd, 15 December 2016

28. Following is a brief review (with comment) of the section on commercial fisheries in this expert evidence by Dr MacDiarmid.

29. This paper considers "Effects on commercial fish species" from paragraph 75 on page 33 to paragraph 80 on page 34. Paragraphs 75-79 provide summaries for each of the main commercial fishing methods of relevance to the area. These paragraphs on the STB commercial fisheries are based on "Report 18-NIWA South Taranaki Bight Commercial Fisheries Report FINAL May 2016.pdf" by MacDiarmid and Ballara which "*summarised the effort and catch for each fishing method over the period 2006 to 2015 and for the*

principal methods of capture indicated the spatial distribution of the fishery in the STB."

30. This report also addresses the issue of likely suspended solids concentrations resulting from sand mining operations and their impact on fish distribution. [I have read Report 18 and in the context of understanding the interactions between commercial fishing and the proposed TTR sand mining, I find it a very informative, comprehensive and helpful report. It more than covers any recent time gap in the Fathom Report for the most recent available commercial fisheries data between 1 October 2013 and 30 September 2015.

31. I accept the content of paragraphs 75-79 as credible and reliable. Paragraph 80 states: "*In my opinion, the effects of the proposed iron recovery operations on commercial fish species will be negligible.*" I agree with the conclusion in paragraph 80. These are consistent with the findings in Reports 17 and 18.

Review of Report 18: South Taranaki Bight Commercial Fisheries 1 October 2006 – 30 September 2015. *Prepared for Trans-Tasman Resources Ltd May 2016 by MacDiarmid & Ballara*.

32. Following is a general brief comment on Report 18. (Comments are additional to those above on Report 18). This report covers 9 years of commercial fisheries data up to 30 September 2015, the most current fisheries data available at the time of the report preparation, May 2016. In this respect it covers the time period of commercial catch data missing from the Fathom Report. Catch and effort data in Report 18 are overlaid with the proposed inner and outer mining sites and two levels (one high, one low) of projected suspended sediment concentration levels for spatial comparison. What these show is a consistent picture of potentially limited (small) spatial overlap with the proposed mining site and the downstream projected plume footprints.

33. In Report 18, the way the data are presented has come under some criticism in the submission report from Dr Jeremy Helson, (see his paragraph 58 and Fig 1) where he says in relation to the plotting of adjacent data from FMA 7 in the mapped figures, that this should not have been done and is misleading. However, I accept the way these data have been presented in Report 18 as they reflect the situation that the FMA7/8 boundary has no biological reality (i.e. commercially fished species are indifferent to its presence). Including it (the FMA7/8 boundary) means the possible spatial overlap with fishing in the general vicinity of the proposed mining site is more completely considered, and does not detract from the Report 18 conclusions. The concern of Dr Helson may have some weight if potential economic impact factors were being considered. These potential economic impact factors might have more relevance if the potential biological impacts on commercial fisheries were not considered to be small, and if site of catch was included in an economic analysis.

34. As mentioned in my comments above (paragraph 30) on the Expert evidence of Alison MacDiarmid on behalf of TTR Ltd 15 December 2016 “in the context of understanding the interactions between commercial fishing and the proposed TTR sand mining, I find it [Report 18] a very informative, comprehensive and helpful report. It more than covers any recent time gap in the Fathom Report for the most recent available commercial fisheries data between 1 October 2013 and 30 September 2015.

35. The final concluding remark in Report 18 is significant, and based on a consideration of the most recent 9 years of commercial fishing data. This conclusion states that: “*The fisheries with the greatest overlap with the proposed iron sand extraction operations are the bottom trawl fisheries for leather jackets and trevally, and the set-net fisheries for rig, carpet sharks, trevally, school shark, snapper, and spiny dogfish. Between 5% and 17% of the total catches in the study area for these species occur in the area where SSC exceeds the 2 mg/l threshold for fish avoidance 1% of the time. However, the area where SSC exceeds the 2 mg/l threshold for fish avoidance 50% of the time is negligible compared to the scale of the fishery. In addition, the greatest effort and catch in these fisheries in the STB is to the south and east of the area where iron sand extraction is proposed.”*

Review of Primary Expert Evidence of Dr Gregory Matthew Barbara on Marine Ecology for Fisheries Submitters. Dated: 23rd January 2017

36. From Dr Barbara’s report, the following paragraphs in his section on “*Interaction with Fisheries*” are considered here:

37. Paragraphs 66, 68, & 69: – seem to me to be inconsequential statements.

38. Paragraphs 70, 71, 72: No comment

39. Paragraph 73: Should show data to demonstrate that “*the highest catch numbers as reported appear to be in waters within and adjacent the PPA*,” and should indicate whether this refers to total catch or catch rate and whether it is for all species or particular target species.

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40. Paragraph 74 states: *The TTR reports do not directly overlay the catch effort maps with the plume modelling or the PPA, so it is difficult to determine the actual level of overlap. It is my opinion that this uncertainty with the amount of high productivity fishing area to be impacted should be more clearly depicted and discussed*. This undermines or negates comment in para 73

41. Paragraph 75: In part states*: “..the benthic areas within the PPA directly adjacent and to the north west..”* but not clear what this means – or where the area actually is. Paragraph 75 also states: “*If the worm fields are important benthic habitats for fisheries species this may explain the distribution of*

fishing catch return being higher around areas of worm fields". Paragraph 74 also casts doubt on this statement.

42. Paragraph 76: No comment.

43. Paragraph 77states: "*It is my opinion that without a better understanding of the extent of overlap with the PPA, plume impacts and high return fishing areas it is not possible to state that the spatial displacement of the PPA would be minor or not."* Surely this depends on what is meant by "*high return fishing areas.*" Are catch rates in this area really high? The issues in this context are well covered in the submissions by Dr MacDiarmid. In the absence of any data suggesting that the PPA is some kind of fishing hotspot, then given the very small scale of the PPA relative to overall areas of fishing in FMA 8, it is quite possible to state that the spatial displacement is minor and therefore catch displacement will also be minor.

44. Paragraph 78: This is a rather weak critique of the NIWA evidence and methods and is not convincing.

45. Paragraphs 79, 80 & 81: No comment.

46. Paragraph 82: Does not seem to be relevant.

47. Paragraph 83: It's not clear to me what the purpose of this paragraph is or how the mining operations might impact the "jack mackerel". It speaks of jack mackerel as if it is a single species when in fact there are 3 – all 3 species are under the name "jack mackerel" in the QMS system but have different behaviours and depth ranges etc. and the 2 species that are common in the STB midwater trawl catches certainly do. It might make more sense if which of the 3 species it refers to was specified. Going by the references it is likely that the paragraph refers only to *Trachurus declivis* which therefore suggests it omits *Trachurus novaezelandiae*.

48. Paragraphs 84 & 85 and 86 (Conclusions): No comment.

49. Overall I did not find Dr Barbara's submission very informative.

Review of Primary Expert Evidence of Jeremy Graham Helson on Fisheries Management for the Fisheries Submitters. Dated: 23rd January 2017

50. Comment on paragraph 21 which states: "*there is a real risk that the pre-existing rights and the economic well-being of quota owners and fishers will be adversely affected should consent be granted*." It would be more correct to state that these rights "may" be affected rather than "will" be affected.

51. Comment on Dr Helson's paragraph 46 which states: "*The commercial sector involves many entities. As at 17 January 2017 there were 1,356 quota owners, 1,170 registered fishing vessels and 203 licensed fish receivers*." This

is presumably for the whole EEZ & Territorial Sea – it would make more sense to include only those commercial fishing in FMA 8.

52. Comment on paragraph 54 which states: "*Under the QMS, fishers buy ACE to reflect the balance of fish species likely to be encountered. Changes in the relative abundance of fish species as the result of seabed mining will result in catch plans that do not reflect the actual biomass available in the fishery. This has the effect of leaving fishers with either ACE they have paid for but cannot use, or excess catch for which ACE is not available. The latter result in a deemed value bill from the Crown. Both scenarios impose financial costs."* These scenarios are an ongoing reality of commercial fishing under the NZ QMS where at any time fishers, especially bottom trawlers, can expect a mismatch between their catch species mix and their quota or ACE species mix. This is not a situation unique to possible perturbations caused by projects like that proposed by TTR.

53. Comment on Dr Helson's paragraphs 55 & 56: My comments for paragraph 54 apply equally here.

54. Comment on Dr Helson's paragraph 58 which states: "*For each species in the QMS, a number of Quota Management Areas (**QMAs**) are defined. ACE from one QMA cannot be used to catch that species in any other QMA. **Figure 1** below shows that the division between FMA 7 and FMA 8 cuts through the study area defined by NIWA. As such, any analysis of the impact of the plume as a function of the study area fails to appreciate that there are two distinct legal QMAs that apply for many of the most important species in question (e.g. GUR7/8, TAR 7/8, JDO 2/7, FLA2/7, SCH 7/8, SPO 7/8)."* There seems to be some difference between the interpretation of QMAs in the list of species here and similar information in Fathom Report Table 1. However for any species for which the FMA7/8 boundary is a barrier to commercial fishing, this is purely administrative and will have no biological basis. For any commercial fishers who were disadvantaged in their access to such species, and impacted in some way by the TTR mining project there is a solution. If MPI wished to assist with the situation they could simply pass a regulation making it possible to legally target some of the species (for which the FMA 7/8 boundary is an administrative barrier), on either side of the FMA 7/8 boundary. Provided the total catches were within the TACC, this would not have any impact on sustainability of the fishstock(s), but would help any commercial fisher's economic pain should the sand mining impact be more than minor.

55. Comment on Dr Helson's paragraph 59: This could indicate that the caption for figure 3.3 in Report 18 has omitted to mention that it includes a small part of trawl effort and catch in a small closely adjacent piece of FMA 7. However including data from a small adjacent segment of FMA 7 makes biological sense in that the trawl caught fish in this locality will not be behaviourally influenced by the presence of the boundary. I therefore disagree with paragraph 60 In Dr Helson's submission which states: "*the evidence adduced answers the wrong questions*".

56. Comment on Dr Helson's paragraph 64 which states: "*I note that this description of the scale of commercial fishing only considers employment and processing in the local Taranaki/Whanganui area. While that is certainly an important component of any such analysis, it fails to appreciate that fish caught in the Taranaki region may be landed in Auckland, Raglan, Nelson or other ports. Fishers may also be domiciled in other areas. As such, these economic contributions are not included in the contextual description provided.*" This is probably a true statement of the situation but does not weaken the conclusion that the likely impact from the TTR activities will have a negligible effect on the scale of the total fish populations in FMA 8 as well as on the commercial fisheries dependent on those fish populations.

57. Comment on Dr Helson's paragraphs 65 & 66: The scale of the likely biological impact on the fish and fisheries in the vicinity of the proposed TTR mining site is likely to be so small, as to render it difficult if not impossible to determine signal from noise. i.e. the variations caused by the sediment plume may be smaller than or similar to the natural variability over time of species abundance and distribution in the study area. This would make it unrealistic to attempt an economic analysis of the impact on the commercial fisheries, unless it was attempted as a part of an adaptive management project which enables real data of the impact of mining (if any) on the economics of commercial fishing.

58. No comment on paragraphs 67 & 68.

59. Comment on Dr Helson's paragraphs 69-77: The uncertainty while not quantified is possibly over-played, but again, it (uncertainty) cannot be diminished without actual measurements providing real data on plume characteristics and fish behaviour as a part of an adaptive management project.

60. Comment on Dr Helson's paragraphs 78 - 92: I disagree with the somewhat alarmist and possibly overstated sentiment and claims of reputational damage to the international image of NZ fisheries. Again, it is a question of scale, and all the data and analyses so far point to negligible effects on the commercial fish species and therefore fisheries in the general vicinity of the proposed mining activity – a very small area in the whole of EEZ context implied in Dr Helson's comments on reputational damage. There are many statements in these paragraphs 78-92 of the standards of environmental care required to be taken within NZ fisheries. If I might slip into a "helicopter overview" for a moment I suggest that the scale and extent of preparation for the particular environmental impacts of this TTR mining consent process so far exceeds anything that I have seen in relation to comparable environmental assessments of the effects of bottom trawl fishing in the NZ Territorial Seas and Exclusive Economic Zone in the last 45 years.

61. No comment on Paragraphs 93-98.

62. Comment on Dr Helson's paragraph 99: I disagree with 99(a) and 99 (d) and have no additional comments on 99(b) and 99(c).

63. Dr Helsons report also includes a brief Annexure "A" which includes comments on a 2013 MPI submission and on the report by Fathom Consulting Ltd. I have commented on some of the statements in Dr Helson's Annexure A. My comments on the Fathom Report are also dealt with separately at the beginning of my report to EPA.

64. Annexure paragraph 1: Dr Helson states "*little emphasis has been placed on the analysis of Fathom Consulting with reliance instead placed on the NIWA analysis of May 2016*". In my opinion the Fathom Report provides a useful independent analysis, but is largely superceded by the NIWA Report 18.

65. Annexure paragraph 2: The "coarse nature" of some commercial fisheries catch-effort data is real, but this is not a reason for rejecting its inclusion. This paragraph is superceded by the two NIWA Reports, 17 and 18. Report 18 presents a credible account based on analysis of catch-effort data.

66. Annexure paragraph 3: I do not accept Dr Helson's view that the timescale of the Fathom Report was too short. Neither is the more complete time scale in the NIWA Report 18 (9 years) too short. It "provides the DMC a more complete picture of the catch that has been taken from the area in question". It is not inconsistent with the Fathom Report.

67. Annexure paragraphs 4and 5: No comment.

68. Annexure paragraph 6: I disagree with Dr Helson's assertions here. Normal commercial fishing always requires the balancing (not always possible) of bottom trawling fish species catch mix with quota/ACE fish stock holdings. While this may be a result of the spatial displacement caused by mining, it is likely to be of scale no more than normally encountered by normal fishing activity.

Review of Expert Rebuttal Evidence of Alison MacDiarmid on Behalf of Trans Tasman Resources Limited. 9 February 2017.

69. Dr MacDiarmid states in the section on commercial fisheries in paragraphs 25-28: *25. In paragraph 50 of his evidence Dr Helson suggests that the NIWA report on STB Commercial Fisheries and my First Statement of evidence addressing the effects on fish are incorrectly conflated with the effects on fisheries.*

    26. Fisheries depend on the availability of fish. NIWA assessed the impact on STB fisheries by considering the overlap between commercial fisheries and the area from which commercial fish species would likely be displaced. I consider this to be an appropriate way of assessing impact on fisheries as the

commercial fisheries are dependent on the distribution of fished species. In fact this is what commercial fisheries do every day – they adjust to a changing distribution of fish.

27. In paragraphs 57-60 Dr Helson points out that a small part of the area considered in the analysis of effects of the proposed operations on fishing activities lies within Fisheries Management Area (FMA) 7 and thus underestimates the impact of the mining plume on commercial operations.

28. It is correct that the report was focused on the STB as a whole – indeed Dr Helson was present at a meeting which discussed an earlier extraction of these data from this same area and called for a re-extraction of the data including the most recent years and analysis by a different method. This was done. I note that the assessment did not include catches in FMA8 north of New Plymouth. Inclusion of these catches would have lessened the impact of the proposed activities as a percentage of overall catches.

70. I agree with these statements in Dr MacDiarmid's paragraphs 26-28.

Review of Primary Expert Evidence of Andrew Peter Smith on Fisheries Management for Fisheries Submitters. Dated: 23rd January 2017

71. Some of Andrew Smith's concerns in relation to sediment plume impacts on commercial fisheries appear to be based on some severe worst case scenarios that are difficult to reconcile with what is understood about the nature of hydrodynamics in the central NZ region, including the STB. For instance to suggest (paragraph 17) that the West Coast hoki spawning fishery could be adversely affected by suspended sediments from the TTR mining activity 124 nautical miles away up-current is a highly unlikely and unrealistic scenario.

72. Andrew Smith's comments (paragraph 18) about a "natural plume" in a satellite image of the central NZ region are likely to have confused the nature of biological versus physical attributes of the 'plumes" in the image. While it is possible that these areas of discoloured oceanic water may contain some wave-entrained and/or river sediments, they will also contain huge amounts of biological activity commencing with major phytoplankton responses to elevated nutrient levels caused by upwelling, some in the vicinity of Kahurangi shoals. The phytoplankton will in turn stimulate high growth in small algal feeding zooplankton and so on up the food chain. This large scale biological activity will be contributing to the apparent discolouration of the ocean in his Annexure C. The biological activity within these plumes will result in the ocean colour attributes changing over time as the plumes and eddies are followed across the STB.

73. The strong tidal flows that Andrew Smith mentions in the Cook Strait region (paragraph 20) and other concerns (paragraphs 21-25, & 27) appear to be taken into account in the sediment plume modelling by the TTR. Until there

are empirical data available from following sediment drift from actual mining, there is no way of complete certainty being provided by SSC plume modelling. This suggests that an adaptive management approach may be the best way forward.

74. Andrew Smith's concerns in his paragraph 28 based on a single vessel over 2 years of fishing are addressed adequately in Report 18, where all fishing effort by all vessels, concerning all methods for all commercial species for the most recent 9 years of data are described and analysed. The single vessel example provided by Mr Smith is a small part of a much larger picture and is already incorporated within the much broader analyses in Report 18.

75. In the event of commercial fish species moving out of the area of mining disturbance for any of the reasons given in Mr Smith's paragraphs 29-33, 35 & 37, then this does not mean these fish would not still be available to the commercial fleets – perhaps with the exception that some benthic feeding fish species may be attracted to the opportunity to feed on newly accessible benthic animals on the up-current side of the freshly disturbed seabed near the crawler unit.

76. The information covered in Mr Smith's paragraphs 38-40 and associated annexures G1-G6 does not add much value by showing presence-absence data where a number of species have been previously caught. Much more meaningful consideration of catch effort and catch distribution data on a large scale for the whole of FMA 8 for the last 9 years is provided in Report 18 and the comprehensive distributional data and modelling in Report 17. This analysis supercedes and addresses most of the issues in Mr Smith's paragraphs 38-40.

Review of Primary Expert Evidence of Helen Margaret Anderson on Environmental Planning for Fisheries Submitters. Dated: 23rd January 2017

77. This submission by Ms Anderson considers and summarises a number of concerns from Fisheries Submitters in paragraphs 62-77. These are:

- Potential Bio-Physical Effects on Existing Fishing Interests

78. Ms Anderson states aspects of concern as (paragraph 62) "*the impact on pelagic and other fish species and their food sources resulting from changes in turbidity of the water, noise and light generated by the mining operation, increases in heavy metals in the water column and potential spatial displacement of quota and non-quota species from the significant volume of water and de-ored sediments that are being returned to the marine environment*." She quotes Dr Barbara's statement that mining operation noise may impact marine mammals and extrapolates this by stating (paragraph 63) that "*This may mean that the noise impact predictions on marine fauna may not be appropriate*." While this may be so, there is no basis for this assertion.

It is the kind of impact that is unlikely to be quantified unless there is an adaptive management approach taken.

79. In paragraph 64 Ms Anderson quotes Dr Barbara as "*TTR's modelling of the sediment plume has been based on the assumption that the mined sands contain less than 4% clay and silts. Should concentrations of clay and silts be greater than 4%, then Dr Barbara considers that the deposition of clays and silts is likely to travel further distances and these would therefore have greater impacts than the modelled sand deposition."* She goes on to quote Dr Barbara further in: "*his expert evidence considers that the number of cores used to describe the mud layer (two, with a third unreported) is inadequate to give sufficiently detailed description of the distribution of the mud layer throughout the project area.* This may well be a valid point, but whatever the description of the composition of the mud layers, the impacts on biota could be assessed by an adaptive management programme.

80. Paragraph 65 – no comment.

81. In paragraph 66 Ms Anderson quotes Dr Barbara's conclusion that "*without a better understanding of the extent of overlap with the PPA, plume impacts and high return fishing areas, it is not possible to state that the spatial displacement of the PPA would be minor or not*. In my opinion the apparent small spatial scale of these potential impacts suggests that it is possible that their effects will also be minor. Again, the true nature of these impacts on biota could be assessed by an adaptive management programme.

- Potential Effects on Management of Existing Fishing Interests

82. I have no comment on Ms Andersons paragraph 67 a-d. I have already commented on these in the sections in Dr Helson's report.

- Potential Effects of Changes to the Seabed on Existing Trawling Activities

83. The potential risks (paragraph 69) from large scale irregularities created on the sea-bed by the proposed mining activities as mentioned in Mr Smith's submission, is real. What may be overstated is the scale and duration of these seabed irregularities. The points referred to and suggestions in paragraphs 70 & 71 (from Mr Todd's submission) are quite reasonable and would eliminate any risks associated with persistent seabed irregularities following sand extraction.

- Potential Effects on Existing Surf Clam Fishery

84. I have no comment on paragraphs 72-74. The surf clam fisheries issues are covered in Dr MacDiarmid's Report 17.

- Biosecurity Issues

85. The concerns expressed in paragraphs 75-77 are valid and should be given a high profile. There are real risks with toxic algae being introduced or spread

by arriving ships' ballast water and rigorous procedures may be required to minimise these risks if this project is to proceed. Toxic algal blooms could have widespread and serious impacts on marine life in general and commercial fisheries in particular.

- Consultation

86. I have no comment on consultation (paragraphs 78-79).

87. Regarding Ms Anderson's conclusion in paragraph 98, concerning an adaptive management approach, I do not agree with her comment that an "*adaptive management approach (therefore) cannot be taken*". She bases this on the statements that she "*consider[s] that there is uncertainty as to the potential impacts of the proposal on existing fishing interests. Furthermore, I do not consider that the Applicant has sufficient baseline information about the receiving environment or existing fishing activities to enable potential changes resulting from the proposal to be appropriately monitored or addressed through environmental triggers (i.e. conditions of consent).*" I disagree with this conclusion. I would regard the aspects Ms Anderson gives as reasons for these statements (not to implement an adaptive management programme) to be the very aspects that would suggest to me that an adaptive management approach **is** appropriate.

Review of Primary Expert Evidence of Douglas Saunders-Loder for Fisheries Submitters. Dated: 24th January 2017

88. In his paragraph 22 Mr Saunders-Loder states: "*For New Zealand to permit an activity that might threaten the stock whilst in New Zealand waters would be contrary to what New Zealand seeks to achieve in this international forum…"* and continues to state: *"I have read the evidence of Andrew Smith and would suggest that given the catch track of the TGL vessel in FMA 8, it is highly probable that the Skipjack Tuna schools migrate through the proposed mining site and plume area*." While I can appreciate some nervousness about the proposed mining activity, there is no basis to suggest that the proposed mining activity could "*threaten the stock whilst in New Zealand waters"*. Further, it is stretching the information to suggest that the TGL vessel track in FMA 8 means that "*Skipjack Tuna schools migrate through the proposed mining site and plume area"*.

89. In his paragraph 27 Mr Saunders-Loder states: "*The migratory stocks of Skipjack and Albacore Tuna vary hugely in terms of volume and location and cannot be guaranteed to be found in any particular area. It is conceivable, if conditions are favourable, that Skipjack Tuna could be caught anywhere along that coast and the presence of the mining operation with its increased sediment loads in this area could be detrimental to them".* These two statements do not logically follow – i.e. that the highly variable presence of Skipjack Tuna means that the "*mining operation with its increased sediment*

loads in this area could be detrimental to them". I disagree with these conclusions of Mr Saunders-Loder. Further if "*migratory stocks of Skipjack and Albacore Tuna vary hugely in terms of volume and location"* then this means that any index of abundance is likely to be highly variable over space and time. If there was some impact on these stocks caused by the proposed mining by TTR it would be challenging to distinguish what that impact might be with such a highly variable species.

90. In part of his paragraph 29, Mr Saunders-Loder states: "*Part of the Rolling Grounds whilst inaccessible to inshore trawlers because of the rocky/undulating surface (foul ground) is regarded as a "nursery ground" and therefore avoided. This is not an uncommon voluntary approach adopted by fishermen throughout various New Zealand fisheries to protect fish spawning areas.*" A nursery ground is usually understood as a locality where high numbers of juveniles of a particular fish species might be found. However it's not clear here that if the "*Rolling Grounds"* are "*inaccessible to inshore trawlers"* whether the avoidance of the area is because it's a *"nursery ground"* or because it's too rough to trawl anyway. The spawning of most commercial fish species involves the release of huge numbers of planktonic eggs which drift for long distances, usually in surface waters. This passive long distance drifting continues with the larvae until they have grown sufficiently to be independent of ocean currents. Fishers may at times claim to avoid spawning fish *"to protect fish spawning areas"* however it is far more common for fishers to target spawning fish as these are the times when large spawning aggregations make high catch rates and high profits possible. This has certainly been the case for a number of fish stocks (e.g. orange roughy and hoki stocks).

91. Comment on Mr Saunders-Loders paragraphs 32-38: Given the small scale of bottom trawl fisheries in the STB, and the small scale of the proposed mining area, relative to fished areas in the STB, even when the plume area is included, the likely impact on commercial fish harvest and on species catch mix is likely to be minor. Annual and spatial variation in commercial catch normally contributes to occasional mismatch in commercial catch species mix with quota holdings or ACE. As mentioned in response to other submitter's comments on the same issue such a species mismatch is a routine fact of life in commercial bottom trawling. It would be difficult to distinguish any short term impact from spatial displacement from normal background variability. The possibility of longer term change through potential cumulative impacts of multiple factors can only be speculated on in the absence of empirical data. Such data are likely to be best obtained through an adaptive management approach.

92. Paragraphs 39-46 – no comment.

93. Comment on Mr Saunders-Loders paragraph 47: I disagree with the statements in this paragraph. The catch and effort maps <u>have</u> been overlain with the plume modelling and proposed mining area (See for example Report 18).

94. Mr Saunders-Loders Paragraph 48 states: "*Any disturbance to the natural environment that is likely to affect fish-stocks at any level has the potential to significantly undermine the existing property rights and capital value of ALL quota-owners but also the livelihoods of ALL fishermen that fish in the area. Given the magnitude of the proposed operation, this is likely to be significant."* This statement seems to overlook the fact that the large scale of bottom trawling is a major "*disturbance to the natural environment that is likely to affect fish-stocks…"*. I suggest that the assertions that there will be significant undermining of the "*existing property rights and capital value of ALL quota-owners but also the livelihoods of ALL fishermen that fish in the area. Given the magnitude of the proposed operation, this is likely to be significant"* is in fact an over-statement.

Summary:

95. Nine items of evidence, reports, submissions etc have been reviewed or commented on in this report with a focus on aspects in these items that related to differences of opinion or questions about the potential for and scale of possible impacts on commercial fish species and fisheries of the proposed sand mining in the STB by TTR Ltd.

96. The nine items reviewed and commented on were as follows:
    - South Taranaki Bight iron sand mining proposal – Assessment of potential impacts on commercial fishing. Prepared by Nici Gibbs, Fathom Consulting Ltd for Trans-Tasman Resources Ltd Final: 5 July 2013.
    - Expert Evidence of Alison MacDiarmid on Behalf of TTR Ltd, 15 December 2016.
    - Report 18: South Taranaki Bight Commercial Fisheries 1 October 2006 – 30 September 2015. Prepared for Trans-Tasman Resources Ltd May 2016 by MacDiarmid & Ballara.
    - Primary Expert Evidence of Dr Gregory Matthew Barbara on Marine Ecology for Fisheries Submitters. Dated: 23rd January 2017.
    - Primary Expert Evidence of Jeremy Graham Helson on Fisheries Management for the Fisheries Submitters. Dated: 23rd January 2017.
    - Expert Rebuttal Evidence of Alison MacDiarmid on Behalf of Trans-Tasman Resources Limited. 9 February 2017.
    - Primary Expert Evidence of Andrew Peter Smith on Fisheries Management for Fisheries Submitters. Dated: 23rd January 2017.
    - Primary Expert Evidence of Helen Margaret Anderson on Environmental Planning for Fisheries Submitters. Dated: 23rd January 2017.
    - Primary Expert Evidence of Douglas Saunders-Loder for Fisheries Submitters. Dated: 24th January 2017.

    In the remaining paragraphs I summarise my comments on these 9 submissions or items of evidence.

97. One of the main issues or points of difference in most of the material reviewed, concerned whether the plume of sediment resulting from sand mining was likely to have a major or a minor impact on the behaviour, distribution, abundance, survival etc on fish species in the vicinity of the suction mining vessel and/or in the vicinity of the suspended sediment plume flowing down-current from the extraction site.

98. If there was determined to be an impact on fish species, the next question is whether this will translate into a major or minor impact on the viability of commercial fisheries dependent on impacted species and currently operating in the vicinity of the proposed mining site. If there was going to be an impact how would this translate into fisheries management?

99. Key points from, or relating to the Fathom Report include:
    - the fact that the most recent MPI catch were not included does not alter the report's conclusions. The additional data and analysis are available in Report 18 which reaches similar conclusions about scale of commercial fisheries potential impact.
    - For the main STB commercial fisheries (bottom trawl, midwater trawl, set netting & bottom long-lining) likely to be impacted, the annual catch of target species and the annual effort is relatively small (except perhaps for the jack mackerel midwater trawl fishery which averages ~10,000 tonnes per year but is outside of the spatial impact area). The fraction of the effort for these fishing methods that overlaps with the proposed mining site is small, supporting the conclusion that commercial catch reduction by spatial exclusion is also small.
    - Although it is not mentioned in either report, I interpret the data and analysis in the Fathom Report and in Report 18 as helping understand the difficulty that might be experienced in distinguishing the difference between any impact caused by spatial displacement or even mining induced mortality from the normal temporal and spatial changes in distribution and abundance of commercial fish species.

100. Key point from the Expert Evidence of Alison MacDiarmid on Behalf of TTR Ltd, 15 December 2016.
    - I commented only on those paragraphs that address effects on commercial fisheries in this report. I agree with Dr MacDiarmid's conclusion that the effects of the proposed iron recovery operations on commercial fish species will be negligible. These are consistent with the findings in Reports 17 and 18.

101. Key points from Report 18: South Taranaki Bight Commercial Fisheries 1 October 2006– 30 September 2015. Prepared for Trans-Tasman Resources Ltd May 2016 by MacDiarmid & Ballara.

- Catch and effort data in Report 18 are overlaid with the proposed inner and outer mining sites and two levels (one high, one low) of projected suspended sediment concentration levels for spatial comparison. What these show is a consistent picture of small spatial overlap with the proposed mining site and the downstream projected plume footprints.
- In presenting the STB catch and effort data Dr MacDiarmid has included a small portion of FMA 7. This has received criticism from Dr Helson who says this is misleading. However, I accept the way these data have been presented in Report 18 as they reflect the situation that the FMA7/8 boundary has no biological reality (i.e. commercially fished species are indifferent to its presence). Including it (the FMA7/8 boundary) means the possible spatial overlap with fishing in the general vicinity of the proposed mining site is more completely considered.
- Report 18 concludes that spatial impact on commercial fish species is small to negligible. I agree with this conclusion.

102. Key points from Primary Expert Evidence of Dr Gregory Matthew Barbara on Marine Ecology for Fisheries Submitters. Dated: 23rd January 2017.

- In Dr Barbara's evidence, his section on "*Interaction with Fisheries*" is considered. This should show data to demonstrate that "*the highest catch numbers as reported appear to be in waters within and adjacent the PPA*," and should indicate whether this refers to total catch or catch rate and whether it is for all species or particular target species, and why it is inconsistent with Dr MacDiarmid's conclusions.
- There are a number of other confusing or contradictory statements in this section of Dr Barbara's evidence which leaves me struggling with the credibility of some of his statements.
- Overall I did not find Dr Barbara's submission very informative or convincing.

103. Key points from Primary Expert Evidence of Jeremy Graham Helson on Fisheries Management for the Fisheries Submitters. Dated: 23rd January 2017.

- Some of Dr Helson's evidence overstates the possible impacts of sand mining on commercial fisheries (e.g. rights <u>will</u> be adversely affected rather than <u>may</u>.) He quotes large figures that relate to the entire NZ fishery when it would make more sense to provide FMA 8.
- He paints a picture of mining going ahead and creating a situation where "c*hanges in the relative abundance of fish species as the result of seabed mining will result in catch plans that do not reflect the actual biomass available in the fishery'.* To imply that this would be a new problem and consequence of mining is misleading. These scenarios are an ongoing reality of commercial fishing under the NZ QMS where at any time fishers, especially bottom trawlers, can expect a mismatch between their catch species mix and their quota or ACE species mix.

This is not a situation unique to possible perturbations caused by projects like that proposed by TTR.

- Dr Helson states that the inclusion of a small area of FMA 7 in the study area used by NIWA should not have been done and is misleading. For any species for which the FMA7/8 boundary is a barrier to commercial fishing, this is purely administrative and will have no biological basis. If it was demonstrated that any commercial fishers were disadvantaged in their access to such species, and impacted in some way by the TTR mining project there is a solution. If MPI wished to assist with the situation they could pass a regulation making it possible to legally target some of the species (for which the FMA 7/8 boundary is an administrative barrier), on either side of the FMA 7/8 boundary. Provided the total catches were within the TACC, this would not have any impact on sustainability of the fishstock(s), but would help any commercial fisher's economic pain should the sand mining impact be more than minor.
- The scale of likely biological impact on the fish and fisheries in the vicinity of the proposed TTR mining site is likely to be so small, as to render it difficult if not impossible to determine signal from noise. i.e. variations caused by the sediment plume may be smaller than or similar to the natural variability over time of species abundance and distribution in the study area. This would make it unrealistic to attempt an economic analysis of the impact on the commercial fisheries, unless it was attempted as a part of an adaptive management project which provides real data of the impact of mining (if any) on the economics of commercial fishing.
- I disagree with the possibly overstated sentiment and claims of reputational damage to the international image of NZ fisheries. It is a question of scale, and all the data and analyses so far point to negligible effects on the commercial fish species and therefore fisheries in the general vicinity of the proposed mining activity – a very small area in the whole of EEZ context implied in Dr Helson's comments on reputational damage.

104. Key point from Expert Rebuttal Evidence of Alison MacDiarmid on Behalf of Trans-Tasman Resources Limited. 9 February 2017.

- I agree with the statements in Dr MacDiarmid's rebuttal evidence in response to two of Dr Helson's criticisms. That is, "*evidence addressing the effects on fish are incorrectly conflated with the effects on fisheries",* and "*the inclusion of a small part of FMA 7 in the study area causing an underestimate of mining on commercial fisheries".* I suggest that including data from a small adjacent segment of FMA 7 makes biological sense in that the trawl caught fish in this locality will not be behaviourally influenced by the presence of the boundary, but they might be close enough to be influenced by mining activity. Better to consider these data than not.

105. Key points from Primary Expert Evidence of Andrew Peter Smith on

Fisheries Management for Fisheries Submitters. Dated: 23rd January 2017.

- Mr Smith is a highly experienced commercial fisherman. I disagree with his assertions about the possible up-current impact of the STB mining plume as far away as the west coast hoki fishery.
- It also seems that Mr Smith may have confused physical and biological properties of central NZ hydrodynamics in relation to the large plumes he refers to in a satellite image. I disagree with his conclusions on this.
- The strong tidal flows he is concerned bout are taken account of in the plume suspended sediment modelling.
- If commercial species move away from the plume they will not necessarily be unavailable to be caught.
- Mr Smith's annexures G1-G6 do not add anything to the discussion. Such aspects are very well addressed in Reports 17 and 18.

106. Key points from Primary Expert Evidence of Helen Margaret Anderson On Environmental Planning for Fisheries Submitters. Dated: 23rd January 2017.

- Ms Anderson is concerned about "*the impact on… fish species and … food sources resulting from changes in turbidity,… noise and light generated by the mining operation, increases in heavy metals in the water column and potential spatial displacement of quota and non-quota species from the significant volume of water and de-ored sediments that are being returned to the marine environment*." In my opinion it is the kind of impact that is unlikely to be quantified unless there is an adaptive management approach taken.
- Ms Anderson quotes Dr Barbara's concerns about clay & silt content of the sediments. This may well be a valid point, but whatever the description of the composition of the mud layers, the impacts on biota could in my opinion be assessed by an adaptive management programme.
- Ms Anderson quotes Dr Barbara's conclusion that "… *it is not possible to state that the spatial displacement of the PPA would be minor or not*. In my opinion the apparent small spatial scale of these potential impacts suggests that it is possible their effects will also be minor. The true nature of these impacts on biota could be assessed by an adaptive management programme.
- The potential risks from large scale irregularities created on the sea-bed by the proposed mining activities as mentioned by Ms Anderson from Mr Smith's submission, is real. What may be overstated is the scale and duration of these seabed irregularities. The suggestions (from Mr Todd's submission) for communication with fishers are reasonable and would eliminate

any risks associated with persistent seabed irregularities following sand extraction.

- The biosecurity concerns about toxic are valid and should be given a high profile. There are real risks with toxic algae being introduced or spread by arriving ships' ballast water. Rigorous procedures may be required to minimise these risks if this project is to proceed. Toxic algal blooms could have widespread and serious impacts on marine life in general and commercial fisheries in particular.
- I disagree with the conclusion that an "*adaptive management approach (therefore) cannot be taken*". I would regard the aspects Ms Anderson gives as reasons for these statements (not to implement an adaptive management programme) to be the very aspects that would suggest to me that an adaptive management approach **is** appropriate.

107. Key points from Primary Expert Evidence of Douglas Saunders-Loder for Fisheries Submitters. Dated: 24th January 2017.

- I disagree with Mr Saunders-Loder suggestion that the proposed mining activity could "*threaten the stock whilst in New Zealand waters"*. Further, it is stretching the information to suggest that the TGL vessel track in FMA 8 means that "*Skipjack Tuna schools migrate through the proposed mining site and plume area"*.
- I disagree with Mr Saunders-Loder conclusion that if "*migratory stocks of Skipjack and Albacore Tuna vary hugely in terms of volume and location"*. This means that any index of abundance is likely to be highly variable over space and time. If there was some impact on these stocks caused by the proposed mining by TTR it would be challenging to distinguish what that impact might be with such a highly variable species.
- It's not clear that if the "*Rolling Grounds"* are "*inaccessible to inshore trawlers"* whether the avoidance of the area is because it's a *"nursery ground"* or because it's too rough to trawl anyway. Fishers may at times claim to avoid spawning fish *"to protect fish spawning areas"* however it is far more common for fishers to target spawning fish as these are the times when large spawning aggregations make high catch rates and high profits possible. This has certainly been the case for a number of fish stocks (e.g. orange roughy and hoki stocks).
- As mentioned in response to other submitter's comments on the issue of a species catch/ACE mismatch this is a routine fact of life in commercial bottom trawling.
- I suggest that the assertions that there will be significant undermining of the "*existing property rights and capital value of ALL quota-owners but also the livelihoods of ALL fishermen that fish in the area. Given the magnitude of the proposed operation, this is likely to be significant"* is a substantial over-statement.