

**BEFORE THE FAST TRACK PANEL
AT WELLINGTON**

**I MUA I TE KŌTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE**

UNDER

the Fast Track Approvals Act 2024
(the “**Act**”)

IN THE MATTER

of an application by Trans-Tasman
Resources for marine and discharge
consents to undertake iron sand
extraction in the South Taranaki
Bight

BETWEEN

**TRANS-TASMAN RESOURCES
LIMITED (TTRL)**

Applicant

AND

**THE ENVIRONMENTAL
PROTECTION AUTHORITY**

The EPA

STATEMENT OF EVIDENCE OF JOHN COCKREM

FILED ON BEHALF OF
KIWIS AGAINST SEABED MINING AND GREENPEACE AOTEAROA
LIMITED

Dated 6 October 2025



AFFIDAVIT OF JOHN COCKREM

I, **JOHN COCKREM**, of Palmerston North, ornithologist, swear/affirm:

- 1 I have the qualifications and experience relevant to this application set out in **Appendix A**.
- 2 I provided evidence as part of the 2017 EPA hearings and the 2024 EPA rehearings, before the Decision-making Committee (**DMC**), on the application by Trans-Tasman Resources for marine and discharge consents to extract iron sands under the Exclusive Economic and Continental Shelf (Environmental Effects) Act 2012.
- 3 As part of those proceedings, I provided the following statements of evidence and oral presentations:

2017 EEZ Application for Marine and Discharge Consents

- a. Statement of evidence dated 23 January 2017.
- b. Statement of rebuttal evidence dated 15 February 2017.
- c. Joint statement of experts in the field of effects on seabirds dated 16 February 2017.
- d. Oral presentation of evidence on 21 February 2017.
- e. Statement of supplementary evidence dated 18 May 2017.

2023 EEZ Reconsideration hearing

- f. Statement of evidence dated 06 October 2024.
 - g. Joint statement of experts in the field of effects on seabirds dated 20 February 2024.
 - h. Oral presentation of evidence on 15 March 2024.
- 4 In preparing this affidavit I have reviewed the application by TTR for marine and discharge consents under the Fast Track Approvals Act 2024.

5 From my review, I understand that the proposed activity and proposed area to be mined remain the same, but the term of the consent has been reduced from 35 years to 20 years.

6 This affidavit does a number of things: It

- a. Considers the application by TTR for marine and discharge consents under the Fast Track Approvals Act 2024 against the previous applications.
- b. Considers whether or not there are any changes in the application between the 2023/24 Reconsideration Hearings and the 2025 application under the Fast Track Act in relation to seabirds.
- c. For those areas that there are changes, I have considered whether the changes impact my findings and evidence that I presented in at the 2024 Rehearing.
- d. Summarise any other relevant data on seabirds that has come to light in the period between the rehearing in 2024 and the current applications.

7 I otherwise adopt and rely upon my statement of evidence dated 6 October 2024 and my statement of evidence dated 23 January 2017, and confirm that both remain my opinion. They also form a more comprehensive response to the evidence of TTRL. I request that the reader start with my evidence from 2023, **Attached as Appendix B**, first, and then go on to read the rest of this statement of evidence second. This provides a clearer idea of the key themes in my evidence and how those have developed over time.

- 8 I have **attached** to this affidavit:
- a. My statement of evidence dated 06 October 2024 and my statement of evidence dated 23 January 2017; Appendix B
 - b. Joint witness statement on seabirds 2023, Appendix C

Code of Conduct

- 9 I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note dated 1 January 2023. 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.

Evidence regarding effects on seabirds

- 10 The conclusions in my updated evidence dated 6 October 2024, and oral evidence before the DMC at the rehearing in Hawera in 2024 included that:
- a. The South Taranaki Bight (STB) is a hotspot for seabirds. The available evidence indicates that approximately half of New Zealand seabird species (and more than 60% of New Zealand marine mammal species) are present in the STB, with at least 100 species of birds feeding in and along the shores of the STB;
 - b. There remains uncertainty around the numbers of seabirds in this area and therefore around the degree of effect. The extent of the adverse effects on seabirds to increased suspended sediment concentrations (SSCs) due to seabed mining cannot be predicted accurately as there are no data on relationships

between SSC and foraging efficiency for the seabirds that would be affected;

- c. Given the existing gaps in information it is not possible to say with any certainty that the proposed conditions are able to avoid material harm;
- d. The available evidence that we do have indicates that the proposed seabed mining in the STB for a period of 20 years, (noting the new 20 year period) would have adverse and cumulative adverse effects on populations of seabirds and would result in material harm. I consider that effects for kororā (little penguins) and fairy prions would be adverse and potentially significant.

I note that my conclusion from 2024, regarding adverse and potentially significant effects, applies to the currently proposed sand mining in the STB for a period of 20 years.

11 The Supreme Court in 2021 found that the information about effects on seabirds from the proposal was uncertain.¹ Glazebrook J referred to “the almost total lack of information in this case on seabirds and marine mammals and the similar issues with the sediment plume and suspended sediment levels” which mean that the DMC could not be satisfied that the requirement to avoid material harm had been met.²

12 In the Joint Witness Statement dated 20 February 2024, Dr Thompson and I confirmed that the matters set out in the Joint Conferencing Statement in 2016 (**JWS 2016**) remained unchanged. These include key areas of uncertainty and baseline monitoring. In summary,

¹ *Trans-Tasman Resources Ltd v Taranaki-Whanganui Conservation Board* [2021] NZSC 127, [2021] 1 NZLR 801 (*TTR*) at [125] per William Young and Ellen France J, at [272] per Glazebrook J, at [294] per Williams J, at [328] per Winkelmann CJ.

² *Trans-Tasman Resources Ltd v Taranaki-Whanganui Conservation Board* [2021] NZSC 127, [2021] 1 NZLR 801 (*TTR*) at [274] per Glazebrook J.

significant uncertainties persist regarding seabird impacts. No systematic baseline surveys have been undertaken within the STB or along adjacent coastlines ([6d]–[6e] of JWS 2016), leaving the extent of little penguin breeding and use of the Bight unresolved. I considered the STB potentially crucial to the survival of Marlborough Sounds penguin populations, but Dr Thompson disagreed ([6f] of JWS 2016). Similarly, there was no consensus on whether increased turbidity and reduced light would materially impair foraging for penguins and other seabirds ([6i]–[6l] of JWS 2016), or whether reduced prey availability could affect large numbers of fairy prions breeding at Stephens Island ([6k]). While both experts acknowledged risks from vessel lighting ([6m]), there remains no agreed monitoring design, and I considered two years of seabird monitoring inadequate to detect population-level effects ([6o]–[6p]). These evidential gaps and conflicting assessments leave core uncertainties unresolved.

12. The only new matters referred to in the JWS 2024 related to further information on the presence of seabirds in the area, including:³

- a. new evidence of kororā from Mana Island (top of the South Island) swimming to the STB to feed;
- b. a list of seabirds species likely to occur in the STB that contains species that were not included in the 2017 evidence;
- c. the statement that the extent of adverse effects on seabirds of climate change and associated declines in some seabird populations is now known to be much greater than was apparent in 2017; and
- d. the STB being designated as a key biodiversity area by the IUCN.

13. As far as I can ascertain, TTR has done no further studies on seabirds since its 2016 application.

³ Joint Statement of Experts in the Field of Effects on Seabirds, 20 February 2024 at [9].

Conclusions regarding effects on seabirds from the TTR 2025 Fast Track Application

14. In preparing this affidavit I have considered:

- a. The Taranaki VTM Application
- b. Niwa Report: *Seabirds of South Taranaki Bight, Prepared for Trans-Tasman Resources, Updated Nov 2015*
- c. Evidence of Dr David Thompson before the Environment Protection Authority, 19 May 2023
- d. Rebuttal evidence of Dr David Thompson 23 January 2023

15. Having reviewed these documents and with respect to the effects on seabirds, the proposal is the same other than the change in consent duration from 35 years to 20 years. I note however, that this change is mentioned in the cover letter only and not in the application documents themselves.

16. My position put forward in my statement of evidence in 2023 and in oral presentations to the DMC in 2024 remains the same as summarised above in paragraph [9].

Any other relevant data on seabirds

17. In my statement of evidence in 2023 I also reviewed and updated my statement of evidence filed in 2015.

18. I have undertaken a similar task in preparing evidence for this affidavit. I have considered whether or not there are any further studies that have been undertaken between 2023 and now and whether this data impacts my conclusions. I am not aware of any further studies of seabirds in the South Taranaki Bight.

John Cockrem

06 October 2025

APPENDIX A

- 1 I hold a BSc(Hons) from Massey University and a PhD from the University of Bristol.
- 2 I am a Professor of Comparative Endocrinology at Massey University, Palmerston North (0.5 FTE). The current evidence is presented in my capacity as an independent biologist and not as an employee or representative of Massey University.
- 3 I have published 118 refereed journal articles, two ebooks, and six refereed book chapters, and have more than 170 other publications. My Google Scholar h-index is 41. I have more than 5 000 citations in Google Scholar, with 10 papers that have more than 100 citations. My most highly cited first author paper has 498 citations in Google Scholar. I have given 110 seminars and invited lectures, and 37 community talks to a wide range of groups.
- 4 Elsevier is one of top five international academic publishing companies. Elsevier has a database of citation scores calculated from Scopus records for publications over the last 200 years
<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/5>. Citation scores "focus on impact (citations) rather than productivity (number of publications) and also incorporate information on co-authorship and author positions".
- 5 The Elsevier citation scores indicate the impact of each scientist on their research field. My citation score is in the top 1% of the more than 9 million scientists in the database.
- 6 I have been a visiting scientist in the United Kingdom, Sweden, Japan, and the United States. International consultancy work has been performed for the United States Navy Office of Naval Research and for the National Commission for Wildlife Conservation and Development in Saudi Arabia. National consultancy work has been performed for the Ministry of Primary

Industries and the Department of Conservation. Invited plenary lectures, conference papers and lectures have been given in New Zealand and in 20 other countries.

- 7 I am an ornithologist and penguin biologist with more than 40 years of professional experience in ornithology.
- 8 I have 35 years of experience in penguin research and have made seven trips to Antarctica to work with Adelie and emperor penguins. I have worked with hoiho (yellow-eyed penguins) and kororā in New Zealand, have published refereed journal articles and book chapters about penguins, and have made presentations at national and international penguin conferences.
- 9 The title for my current research programme is "He kororā, he tohu orange" which means "The little penguin is the sign of life". In mātauranga Māori the success of korora populations indicates the health of the coastal environment.
- 10 I have established new nestbox colonies of kororā on Mana Island off the Porirua coast, on Kapiti Island, and at Napier Port, Port Tarakohe in Golden Bay, Kaiteriteri in Tasman Bay, and on Waiheke Island in the Hauraki Gulf.
- 11 The establishment of the kororā nestbox colony on Mana Island was a project with Ngāti Toa Rangatira. This project, entitled "Kororā and coastal kaitiakitanga", was funded by a grant from the Vision Mātauranga Capability Fund of the Ministry of Business, Innovation and Employment.
- 12 Field studies of kororā, in collaboration with colleagues at Napier Port and in community groups, are being conducted to determine breeding success and survival of kororā at my six study sites. I have experience with studies of foraging areas and diving behaviour for kororā and hoiho, using tracking devices that record GPS location and diving data.
- 13 I have prepared and commented on avifauna and penguin management plans, written consent conditions for resource consent applications, and have

worked with consenting authorities to develop and revise conditions for penguin management plans.

- 14 I am often called on for media interviews in relation to penguins in New Zealand and overseas.
- 15 There were at least 133 mentions of my kororā work in news articles, public documents, and social media posts in 2021 and 2022.
- 16 Public talks on kororā have been given to community groups that range from primary school pupils in a classroom on Aotea Great Barrier Island to a TEDx talk to an audience of 1 000 people in the St James Theatre in Wellington.
- 17 Awards and distinctions that I have received include:
 - 2022 Massey University Research Medal for Exceptional Research Citizenship (Whaowhia Ngā Kete o Te Wānanga)
 - I was elected as an Honorary Fellow of the American Ornithologists' Union (AOU) in 2011. The membership category of Honorary Fellow of the AOU is defined as: "Honorary Fellows shall be limited to 100. They shall be chosen for exceptional ornithological eminence and must at the time of their election be residents of a country other than the United States or Canada".
 - In 2010 I was elected as a member of the Executive Committee of the International Ornithologists' Union (IOU). The nomination letter from the President of the IOU stated: "Your election was based on the nomination and recommendation of the Past-President of the IOU, on the excellence of your scientific work, and on your involvement in promoting ornithology".
 - Visiting Research Professor, Kyushu University, Fukuoka, Japan, 2015.
 - Fulbright New Zealand Scholar Award, 2014 and 2015.
 - Affiliate Faculty member, University of Montana, United States, 2014.
 - Chair of the Scientific Programme Committee for the 25th International Ornithological Congress, Campos do Jordao, Brazil, 2008 and 2009.
 - Japan Society for the Promotion of Science Fellowship, 2008.

APPENDIX B

**BEFORE THE ENVIRONMENT PROTECTION AUTHORITY
AT WELLINGTON**

**I MUA I TE KŌTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE**

UNDER	the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
IN THE MATTER	of a reconsideration of evidence by a decision-making committee appointed to consider a marine consent application by Trans Tasman Resources Limited to undertake iron ore extraction from the seabed in the South Taranaki Bight
BETWEEN	TRANS-TASMAN RESOURCES LIMITED Applicant
AND	KIWIS AGAINST SEABED MINING INCORPORATED Submitter
AND	GREENPEACE AOTEAROA LIMITED Submitter

**STATEMENT OF EVIDENCE OF JOHN COCKREM
ON BEHALF OF KASM AND GREENPEACE
Dated 06 October 2023**

Counsel Acting:
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Ruby Haazen
Barrister
Magdalene Chambers, Whanganui



Introduction

1 My name is John Fenton Cockrem.

2 I have the qualifications and experience relevant to this application set out in **Appendix B**.

3 I provided evidence as part of the 2017 hearings before the Decision-making Committee (**DMC**) of this application. I have previously provided the following statements of evidence and oral presentations:

- a. Statement of evidence dated 23 January 2017.
- b. Statement of rebuttal evidence dated 15 February 2017.
- c. Joint statement of experts in the field of effects on seabirds dated 16 February 2017.
- d. Oral presentation of evidence on 21 February 2017.
- e. Statement of supplementary evidence dated 18 May 2017.

Code of Conduct

4 I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note dated 1 January 2023. 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 Evidence

5 I have been asked to:

- a. review and update the evidence I provided to the 2017 DMC given any further information that has become available;
- b. review the updated evidence provided by Trans-Tasman Resources Limited, dated 19 May 2023; and
- c. review and update my evidence in light of the directions set out in the decision of the Supreme Court in *Trans-*

6 In this evidence I refer to both the New Zealand Threat Classification System and the International Union for Conservation of Nature (IUCN) Red List of Threatened Species¹. The IUCN is internationally recognised as the authoritative information source on the global extinction risk status of animal, fungus and plant species (IUCN, 2023). Further explanation of these two classifications is set out in **Appendix C**.

Further information available since 2017

7 This review updates my evidence presented in 2017 and includes information available since 2017.

8 In his evidence, Thompson notes that we don't know anything more about seabirds in the STB than 2017. I disagree with this statement. There is now a much more comprehensive list of seabird species than was available to the DMC in 2017.

9 Newly available results of kororā tracking studies show that, in addition to swimming very long distances from the Marlborough Sounds to the Patea Shoals, kororā from Mana Island swim long distances to feed in the STB.

10 The unique characteristics of the STB as a key area for seabirds are now recognised. The designation by the IUCN (International Union for Conservation of Nature) of the Cook Strait and Marlborough Sounds key biodiversity areas (KBAs; "the most important places in the world for species and their habitats") was not included in evidence presented to the DMC in 2017. These KBAs include all the waters of the STB, Cook Strait, and the inner waters of Marlborough Sounds,

¹ (<https://www.iucnredlist.org>).

- 11 The extent of adverse effects on seabirds of climate change and likely declines of seabirds associated with increased sea surface temperatures is now known to be much greater than was apparent in 2017.

Seabirds

- 12 Seabirds acquire their food at sea, while shorebirds live and feed along coastlines and estuaries. Seabirds include the penguins, albatrosses, petrels, shearwaters, skuas, gulls, terns, gannets and shags².
- 13 At least 145 species of seabirds occur in New Zealand waters³. 95 of these species breed here, with more than one third of these breeding species being endemic. New Zealand has the greatest number of resident seabird species and the greatest number of endemic seabird species of any country⁴. More than one third of all seabird species are found in the New Zealand EEZ during their non-breeding periods⁵.
- 14 Seabirds are declining at a rate faster than any other avian group⁶. Seabirds are ranked by the IUCN (International Union for Conservation of Nature) as the world's most threatened bird grouping⁷. Seabird species in the IUCN Red List categories high, very high or extremely high risk of extinction (IUCN, 2023) include 72% of Sphenisciformes (penguins) and 63% of Procellariiformes (albatrosses, petrels and shearwaters)⁸.
- 15 Almost half of the world's seabird species are listed as globally threatened or near threatened with extinction by the IUCN⁹. For seabird species for which the population trend is known, over half the species (56%) are in decline¹⁰. In New Zealand, 90% of native seabirds and 82 % of native

² Young and Ballance, 2023b

³ Fisheries New Zealand, 2022.

⁴ Forest & Bird, 2014b.

⁵ Whitehead et al., 2019.

⁶ Croxall et al., 2012.

⁷ Forest & Bird, 2014b.

⁸ Young and Ballance, 2023b.

⁹ Dias et al., 2019.

¹⁰ Phillips et al., 2023.

shorebirds were classified in 2016 as threatened with extinction or at risk of becoming threatened with extinction¹¹.

Occurrence of seabirds in the South Taranaki Bight

16 The South Taranaki Bight (STB) is a nationally and internationally important area for seabirds. Available information indicates that approximately half of the seabird species recorded in NZ waters use the STB, with records of very large numbers of seabirds in the STB¹².

17 **Table 1 in Appendix D** shows the seabird taxa (species or subspecies) likely to occur in the South Taranaki Bight. The table of 76 taxa includes 64 taxa identified by Dr R. Scofield¹³ and 12 additional species not in Scofield's list for which there are South Taranaki Bight records in eBird¹⁴. This table was not presented in my 2017 evidence.

18 Dr Scofield's data has been available since 2014 but to date have not been made available to the DMC. Dr Scofield, a leading New Zealand ornithologist, is a senior researcher at the Canterbury Museum. He has 235 publications and more than 8100 citations in Google Scholar. In 2014, Dr Scofield prepared a list of 64 bird taxa considered likely to occur in the South Taranaki Bight¹⁵. The list was "based on records in Ornithological Society of New Zealand (OSNZ) publications (Notornis and OSNZ News), the OSNZ Atlas of bird distribution in New Zealand 1999-2004 (Robertson *et al.*, 2007), the published distribution of seabird species in the eastern Tasman Sea (Checklist Committee of the Ornithological Society of New Zealand, 2010), and analysis of published OSNZ Beach Petrol results (especially Powlesland (1985)), and observations available at <http://www.birdingnz.net/forum>".

¹¹ Ministry for the Environment and Stats NZ, 2022.

¹² There is a report of at least 100 000 prions seen less than 10 km from the proposed sand mining area, and more than 10 000 prions and 10 000 sooty shearwaters per hour have been seen passing Waverly Beach

¹³ Scofield, 2014

¹⁴ (<https://ebird.org/newzealand/home>).

¹⁵ Scofield, 2014

19 In his statement dated 19 May 2023, Thompson has a table that identifies 45 seabird taxa and 14 shorebird taxa likely to occur in or adjacent to the STB. This table is the same table that he presented in 2016 (with the exception of one species in the 2016 table not included in the 2023 table). The 2023 table does not refer to Scofield and has not been updated to include currently available eBird records. I consider Scofield's review in 2014 to be a more thorough approach. The 2014 Dr Scofield table identifying species is the most extensive table for region that has previously been published.

20 **Table 1, Appendix D** that combines Dr Scofield's list and eBird records is now the most extensive table produced for this region. Table 1 identifies 76 taxa but is still not a complete assessment, and there will be seabird species in the STB that are not included in the Table 1. There are approximately 145¹⁶ species of seabirds known in NZ waters¹⁷, so approximately half of the seabird species recorded in New Zealand waters can be considered to be present in the South Taranaki Bight.

21 No systematic observations have been made from boats to determine the abundance and distribution of seabirds in the South Taranaki Bight throughout the year and across different years. The total number of seabird species using the STB is therefore not known. This is not unusual for New Zealand coastal waters.

22 In my evidence in 2017 I also noted that there have not been systematic at-sea surveys of seabirds in the STB. This gap in information was noted by the DMC and referenced in its 2017 decision. To my knowledge, no seabird observations have been undertaken by TTR.

¹⁶ There are different estimates of the total number of seabirds known in NZ waters, so it is stated that approximately half of the seabird taxa occur in the STB.

¹⁷ Fisheries New Zealand, 2020.

Occurrence of shorebirds in the South Taranaki Bight

- 23 Shorebirds live and feed along coastlines and estuaries. Some New Zealand bird species, such as red-billed gulls, are both shorebirds and seabirds, as they feed along coastlines, in estuaries, and at sea.
- 24 **Table 2, Appendix E** shows 34 shorebird species likely to occur in the South Taranaki Bight that are not already included in the 76 seabird taxa listed in Table 1. The 34 species have eBird records in the Cook Strait Important Bird Area (IBA). Shorebird habitats in this IBA are predominantly in the STB.

Threat status of birds in the South Taranaki Bight

Seabirds

- 25 76 species of seabirds have been identified as likely to occur in the STB (see **Table 1, Appendix D**). 14 of the species are threatened and 32 of the species are classified as at risk in the New Zealand Threat Classification System. A total of 46 seabird species (61% of the seabird species in the STB) are classified as threatened or at risk.
- 26 Three seabird taxa occurring in the STB are classified as threatened - nationally critical (Antipodean albatross, Gibson's albatross and Salvin's mollymawk), three others are classified as threatened - nationally endangered (black-fronted tern, New Zealand king shag and yellow-eyed penguin), and eight species are classified as threatened - nationally vulnerable.
- 27 Seven seabird species classified by the IUCN as threatened on a global scale are not classified as threatened in New Zealand. When the New Zealand and IUCN classifications are combined, there are 21 species of threatened seabirds that occur in the STB.

Shorebirds

- 28 34 species of shorebird not already included in the 76 species of seabirds are likely to occur in the STB (see **Table 2, Appendix E**). Five of the

species are threatened and eight of the species are classified as at risk in the New Zealand Threat Classification System. Four shorebird species classified by the IUCN as threatened on a global scale are not classified as threatened in New Zealand. When the New Zealand and IUCN classifications are combined, there are nine species of threatened shorebirds that occur in the STB.

Total number of threatened species of birds that feed in and along the shores of the STB

29 Using my Table 1 Appendix D and Table 2 Appendix E, the total number of species of seabirds and shorebirds likely to feed in and along the shores of the STB and listed as threatened in the New Zealand and IUCN classifications is 30.

30 At least 50 seabird species present in the STB are considered as threatened, at risk or near threatened in the New Zealand Threat Classification (Robertson et al., 2021) and the IUCN Red List (IUCN, 2023) threat classification.

The South Taranaki Bight is a hotspot for seabirds

31 Seabird hotspots are areas with high species richness and abundance¹⁸.

32 The South Taranaki Bight is a hotspot for seabirds. The available evidence indicates that approximately half of New Zealand seabird species (and more than 60% of New Zealand marine mammal species) are present in the STB, with at least 100 species of birds feeding in and along the shores of the STB.

33 The abundance of seabirds in the STB is associated with high levels of primary production and dense aggregations of zooplankton in the STB. These arise from the combination, unique for New Zealand, of large areas of relatively shallow water, upwellings of cold, nutrient-rich water (brought by

¹⁸ Davies et al., 2021; Santora and Sydeman, 2015

the D'Urville current from the west coast of the South Island), and nutrient input from large rivers. Upwelled nutrient-rich water swept north-eastward past Farewell Spit into the South Taranaki Bight supports enhanced primary productivity (Chiswell et al., 2017) and some of the highest zooplankton biomass concentrations recorded in New Zealand coastal waters (Bradford et al. 1986). A prominent feature of this zooplankton community is the abundance of the euphausiid, *Nyctiphanes australis*, a key component of the diet of several seabird species, including fairy prions and red-billed gull (Harper 1976, Mills et al, 2008).

Importance of the Patea Banks (Patea Shoals) for seabirds

34 The Patea Banks (Patea Shoals) are unique for New Zealand as a large area of relatively shallow water with numerous reefs¹⁹.

35 The importance of the Patea Banks as a feeding area for seabirds is particularly apparent for fairy prions and for kororā (little penguins). Fairy prions, which breed on Takapourewa Island, occur in very large numbers at the Patea Banks²⁰, and kororā swim long distances from the Marlborough Sounds to feed at the Patea Banks²¹.

The South Taranaki Bight is an IUCN Key Biodiversity Area (KBA)

36 The IUCN (International Union for Conservation of Nature), in partnership with other organisations, established the key biodiversity area²² (KBA) programme to identify "the most important places in the world for species and their habitats". The program has global standards and criteria for the identification of key biodiversity areas²³.

37 The Cook Strait and Marlborough Sounds key biodiversity areas (KBAs) were recognised in 2016. These KBAs include all the waters of the STB,

¹⁹ Morrison et al, 2022

²⁰ Jenkins, 1986

²¹ Poupart et al., 2017

²² <https://www.keybiodiversityareas.org/>.

²³ Handley *et al.*, 2023; IUCN, 2022; IUCN (International Union for Conservation of Nature), 2023; KBA Standards and Appeals Committee of IUCN SSC/WCPA, 2022; The KBA Partnership, 2023a; The KBA Partnership, 2023b).

Cook Strait, and the inner waters of Marlborough Sounds, together with 12 seabird sites on the shores of these waters. These KBAs had previously designated as Important Bird and Biodiversity Areas (IBAs) (Forest & Bird, 2014a; Forest & Bird, 2014b). IBAs are sites of international significance for the conservation of the world's birds. IBAs are identified according to internationally recognised criteria that have been applied in more than 200 countries and territories²⁴.

Agreement for the Conservation of Albatrosses and Petrels

38 The Agreement on the Conservation of Albatrosses and Petrels (ACAP)²⁵ is a multilateral agreement which seeks to conserve listed albatrosses, petrels and shearwaters by coordinating international activity to mitigate known threats to their populations. New Zealand is a signatory to this agreement.

39 The Department of Conservation notes that "The Agreement on the Conservation of Albatrosses and Petrels (ACAP), is an international agreement to conserve albatrosses and petrels and provide science-based best practice advice. As the global hotspot for breeding albatrosses and petrels, New Zealand, along with 12 other nations where albatross and petrels breed, signed ACAP in 2001. The agreement was developed under the Convention on the Conservation of Migratory Species of Wild Animals. Parties agree to achieve and maintain, through co-ordinated and co-operative measures, a favourable conservation status for albatrosses and petrels."²⁶

40 11 species of albatrosses and mollymawks and six species of petrels that are included in the ACAP are present in the South Taranaki Bight. These 17 species are 55% of the species included in the ACAP. In other words, the South Taranaki Bight has more than half of the species of albatrosses and petrels for which the New Zealand Government has undertaken, through an

²⁴ BirdLife International, 2010; BirdLife International, 2014; Donald *et al.*, 2019; Forest & Bird, 2014b).

²⁵ (<https://www.acap.aq/>; see Cooper *et al.* (2006)).

²⁶ <https://www.doc.govt.nz/about-us/international-agreements/species/albatrosses-and-petrels/>

international agreement, to achieve and maintain a favourable conservation status.

Kororā (little penguins) in the South Taranaki Bight

41 The kororā (little penguin; *Eudyptula minor*) is also known as the little blue penguin and as the blue penguin, and in Australia is called the fairy penguin. Kororā are found along the coasts of the North and South Islands, Stewart Island, and the Chatham Islands.²⁷

42 The korora is classified as at risk - declining²⁸. The decline of little penguins in New Zealand can be attributed to the combined effects of predation by dogs, predation by other mammalian predators²⁹, disturbance from human activities including loss of suitable nesting habitat and, in some locations, mortality of penguins due to road deaths³⁰.

43 In addition to the threats that have been affecting kororā in recent decades, kororā populations are now threatened by changes in the marine environment due to climate change³¹. Increases in sea surface temperatures that lead to reductions in food availability, and increases in the frequency and intensity of storms, will increasingly lead to declining kororā populations.

The kororā subspecies that occurs in the South Taranaki Bight

44 Two subspecies of little penguins are recognised by the Ornithological Society of New Zealand³². The subspecies are *Eudyptula minor minor* (New Zealand little penguin | kororā) and *Eudyptula minor novaehollandiae* (Australian little penguin). *Eudyptula minor minor* occurs in the South Island on the West Coast and from Golden Bay around the coastline of Tasman Bay and the Marlborough Sounds, and south to north Otago. *Eudyptula*

²⁷ (Checklist Committee of the Ornithological Society of New Zealand, 2022; Marchant and Higgins, 1990; Robertson *et al.*, 2007).

²⁸ (Robertson *et al.*, 2021)

²⁹ (Challies, 2015; Challies and Burleigh, 2004; Dann, 1994; Perriman, 1997)

³⁰ (Braidwood, 2011)

³¹ (Trathan *et al.*, 2015).

³² Checklist Committee of the Ornithological Society of New Zealand, 2022.

minor novaehollandiae is the predominant subspecies in Otago. The population of this subspecies is stable and likely to remain so due to the Southland current which flows northward along the Otago coast³³, bringing relatively cool water associated with good prey availability for penguins.

45 I have visited kororā breeding sites along the coastlines of the North and South Islands and on some offshore islands. Discussions with community groups involved in kororā conservation, as well as data on breeding success at different locations, and on kororā mortality and low breeding success associated with marine heatwaves, together indicate that *Eudyptula minor minor* is declining in the northern half of the North Island. As this decline continues across these northern populations, the STB is likely to become a refuge for the subspecies through those populations that breed from Taranaki to Wellington and from the Marlborough Sounds to Golden Bay, and forage in the STB.

Kororā from Motuara Island in the Marlborough Sounds foraging in the STB

46 Tracking studies of kororā that breed on Motuara Island in the Marlborough Sounds have shown that the Patea Shoals is an important foraging area for these birds during the breeding season.

47 For kororā tracked during incubation in 2015, the focal area for foraging, where the largest concentration of locations occurred, was at the Patea Shoals³⁴ (see Figure 1). Most of the penguins that were tracked during incubation foraged in the Patea Shoals (see Figure 2 for individual foraging locations and Figure 3 for the track of a bird that swam directly north from Motuara Island to forage in the Patea Shoals for several days, then swam back to the island).

48 One of the kororā foraged in waters off Cape Egmont, more than 200 km in a straight line from Motuara Island. This example shows that kororā

³³ Brodie, 1960

³⁴ Poupart et al., 2017

breeding from North Taranaki to Wellington, in the Marlborough Sounds, and in Tasman and Golden Bays, could all forage in the STB.

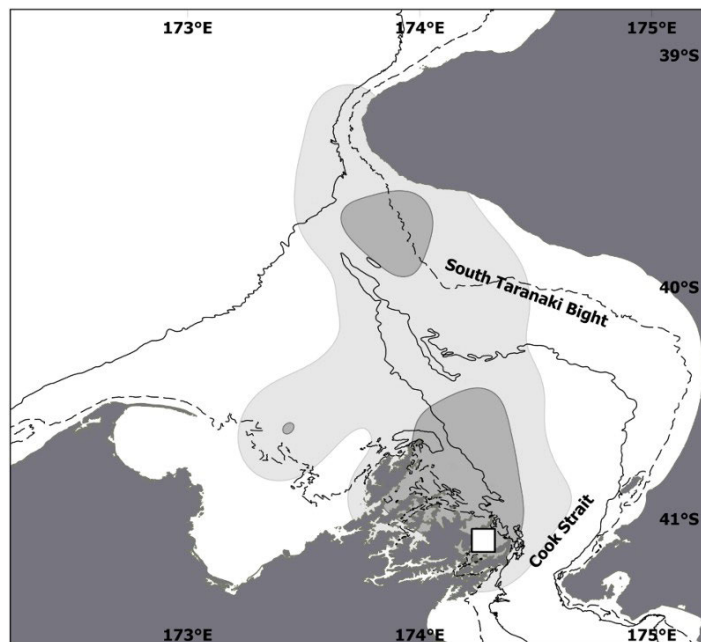
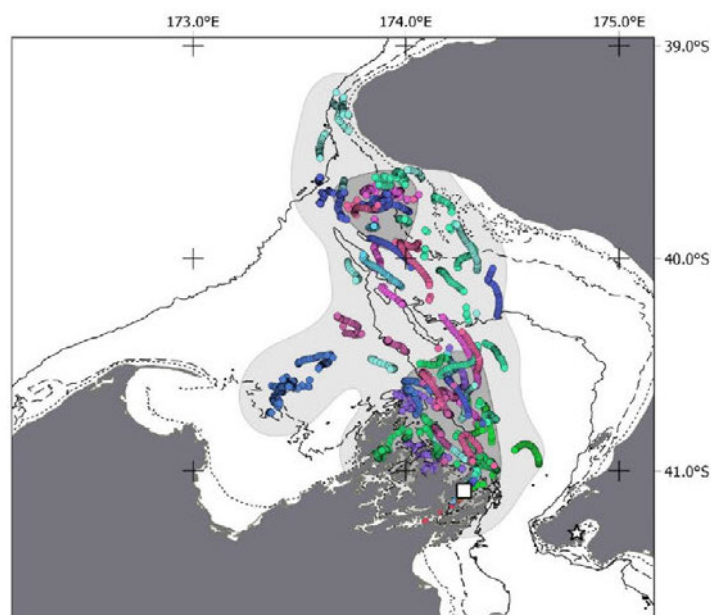


Figure 1. Foraging areas of Motuara Island little penguins during incubation stage in 2015³⁵. The light grey area represents the home range (95% UD), the dark grey the focal area (50% UD). Study colony is shown by the white square. The dashed line is 50 m bathymetric contour; the solid line is 100 m.



³⁵ From Poupart et al., 2017.

Figure 2. Foraging trips completed by fourteen little blue penguins tagged at Motuara Island, Marlborough, during the incubation period in Spring 2015³⁶. Eleven of the fourteen penguins foraged in waters off South Taranaki. These data are Te Papa copyright and are summarised in Poupart et al. (2017).

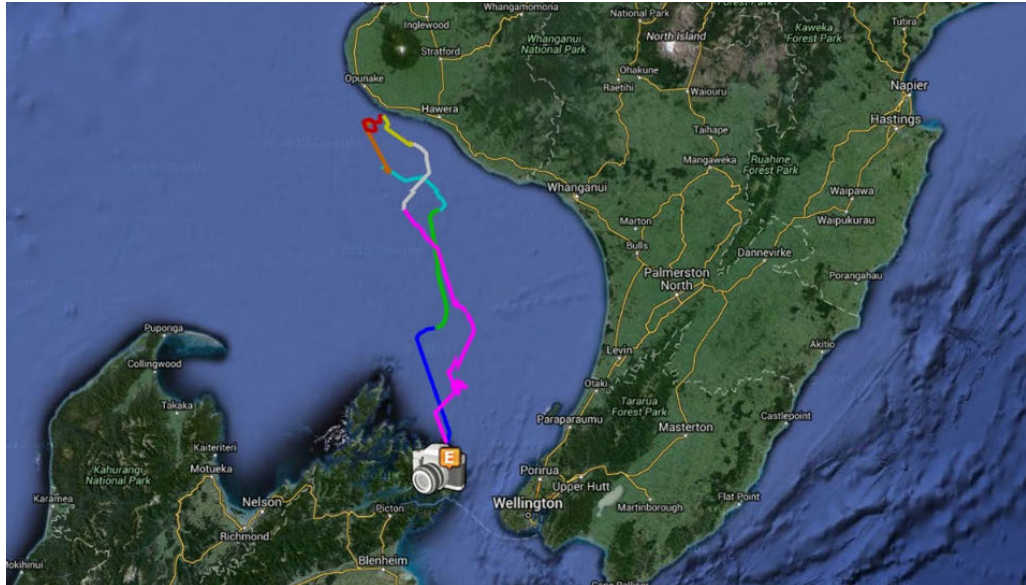


Figure 3. Foraging trip completed by a kororā penguin from Motuara Island (shown with the camera symbol on the map) in the Marlborough Sounds during incubation³⁷.

49 The tracking results of Poupart et al. (2017) are consistent with those of an earlier radiotracking study of kororā on Motuara Island. Some of the penguins tracked during incubation and chick rearing swam north until they were out of radio range and then returned some days later (Mattern, 2001). Long foraging trips (Numata et al., 2000) and low breeding success and chick survival (Numata et al., 2004) indicate that kororā in the Marlborough Sounds experience food shortages during the breeding season. of food and are dependent for breeding on the availability of food in the STB long distances away from their breeding location.

Kororā from Mana Island foraging in the STB

50 I have established a study colony of kororā in nestboxes on Mana Island, off the Porirua coast. Most of the kororā breeding attempts in 2020 were

³⁶ From Nga Motu Marine Reserve Society (2016).

³⁷ From Waugh (2016).

unsuccessful, with eggs abandoned and chicks left to starve to death. Dead chicks were also reported on the ground on Kapiti Island. Chicks that did fledge from Mana Island were relatively light, so their chances of surviving and returning to the island to breed were relatively low. Adult penguins were also relatively light and less likely to survive than in a good year.

51 We tracked kororā during the 2020 breeding season and found that they made foraging trips that were much longer than usual. During incubation, kororā were swimming 150 km north to forage in deep water off the Manawatu and Whanganui coasts (see Figure 4). The tracking data indicate that the penguins could not find sufficient food in the waters along the southern Kapiti coast and out into Cook Strait and had to swim into the South Taranaki Bight (STB) to find food, once again indicating the importance of this area for kororā.

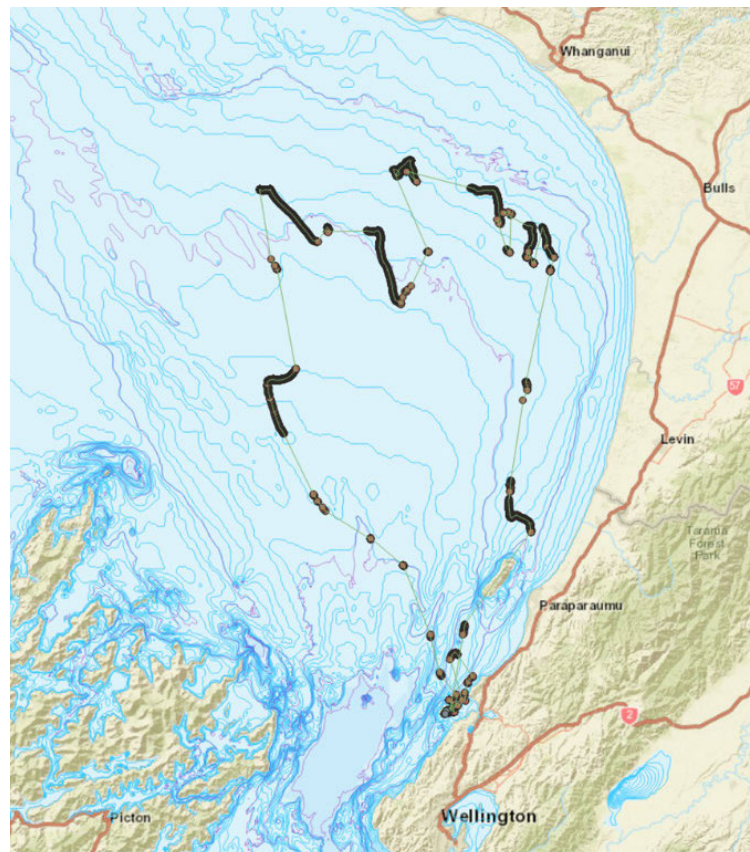


Figure 4. Foraging trip completed by a kororā tracked from Mana Island during the incubation period in spring 2020 (J.F. Cockrem unpublished data).

Fairy prions in the South Taranaki Bight

- 52 Fairy prions breed in New Zealand, islands off the coast of south-eastern Australia, and on some islands in the south Atlantic and southern Indian oceans. They are classified as at risk - relict under the New Zealand Threat Classification System³⁸. In New Zealand, the great majority of fairy prions breed on islands in the outer Marlborough Sounds, with more than 90% of New Zealand fairy prions breeding on Takapourewa Stephens Island.
- 53 The size of the fairy prion breeding population on Takapourewa Stephens Island is not accurately known, nor is it known whether the population is stable, increasing, or decreasing (Jamieson *et al.*, 2016). An estimate of 1.4 million breeding pairs in 2010 came from an unpublished study of 100 nest sites on the island (Craig, 2010). The accuracy of this estimate is not known. The lack of data on the distribution and numbers of fairy prions in New Zealand means that it is not possible to draw any conclusions about population sizes or to assess current population trends (Tennyson, 2016).
- 54 Jenkins (1986) estimated there were "at least 100 000 prions present in about 20 separate feeding flocks" at a location within 10 km of the proposed mining area. Jenkins was a captain of coastal ships and recorded seabird observations over 30 years of voyages around the New Zealand coast (Sibson, 1990). Jenkins,(1986) noted "There have been large numbers of prions in the area each time I have passed through, and it appears that the shallows over the banks, which extend well out to sea between Cape Egmont and Wanganui, are an important prion feeding ground".
- 55 Frost (2009) reported seeing more than 10 000 fairy prions on a day trip from Whanganui into the STB in the winter of 2009. Battley (1986) reported seeing 24 750 prions in two hours and 22 000 sooty shearwaters in 1.5 hours of seabird observations at Waverly Beach in November. Small seabirds, thought to be prions, have been seen in large numbers in the south Taranaki-Whanganui marine area (Rush, 2006).

³⁸ Robertson et al., 2021.

- 56 Fairy prions, like all seabirds, are central place foragers (Tasker and Sydeman, 2023) that are constrained to foraging near the breeding colony to find food to rear their chicks. The maximum daily foraging distance from the breeding colony has been estimated as 100 miles (161 km) for fairy prions breeding on the Poor Knights Islands and making daily foraging trips (Harper, 1976). The area in the Patea Shoals where 100 000 fairy prions was seen is less than 100 km from Takapourewa and is within the daily foraging range of fairy prions during the breeding season when the birds are feeding their chicks.
- 57 Prions are amongst the seabirds most commonly found dead on beaches after bad weather, especially in winter (Harper, 1980; Powlesland, 1989). Approximately 250 000 prions died along the west coast of New Zealand during severe weather in July 2011 (Miskelly, 2011; Tennyson and Miskelly, 2011). Shortages of food have been considered an important cause of the mortality of large numbers of prions (Bull and Boeson, 1963; Powlesland, 1987; Veitch, 1976).
- 58 The cold-water coastal krill (*Nyctiphanes australis*) is the main prey for fairy prions (Fromant *et al.*, 2020; Harper, 1976). In years of marine heatwaves in the Tasman Sea, large bodied cold water euphausiids (*Nyctiphanes australis*) are replaced by smaller zooplankton crustaceans that prefer higher temperatures (Evans *et al.*, 2020). The smaller crustaceans provide less energy and are lower quality food for seabirds than the cold water euphausiids. Reduced availability of *Nyctiphanes australis*, in two years with marine heatwaves, was associated with poor chick growth and reduced breeding success of fairy prions and common diving petrels (Eizenberg *et al.*, 2021; Fromant *et al.*, 2021).
- 59 A local example of marine heatwaves leading to deaths of fairy prions occurred in January 2018. Large numbers of fairy prions were found dead on beaches along the Golden Bay and Tasman Bay coastlines (Hindmarsh, 2018). Fairy prion chicks fledge from Takapourewa Stephens Island in

January and early February, and many of the dead fairy prions were likely to have recently fledged. The fairy prion deaths occurred during a severe marine heatwave when sea surface temperatures in areas of the Tasman Sea were up to 4°C higher than normal (Pinkerton, 2019). Figure 5 shows the dramatic elevations in sea surface temperatures in late January 2018.

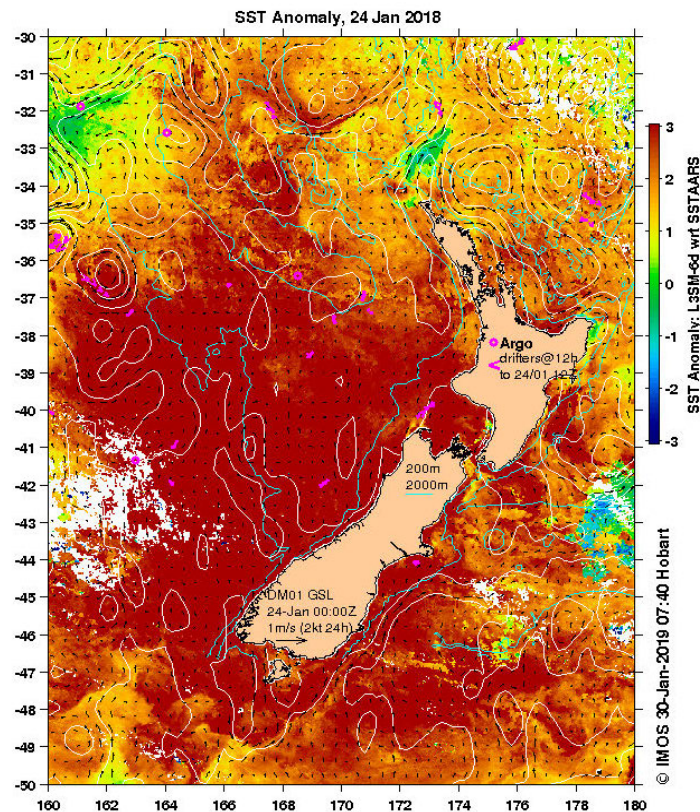


Figure 5. Sea surface temperature (SST) anomalies around New Zealand on 24 January 2018³⁹.

60 The mortality of fairy prions during a marine heatwave in January 2018 (Hindmarsh, 2018) would have been due to a reduction in food availability. This mortality event for fairy prions in the STB shows the vulnerability of the fairy prion population on Takapourewa Stephens Island to food shortages associated with marine heatwaves.

³⁹ (from <https://oceancurrent.aodn.org.au/product.php?product=daily®ion=NZ&date=20180124120000&rtyp=SR>).

- 61 Given the increasing incidence and intensity of marine heatwaves and the consequences for fairy prions of mortality events and reductions in breeding success, it is likely that, due to climate change, the Takapourewa Stephens Island population of fairy prions (the great majority of the New Zealand population) is either declining now or will decline in future.
- 62 The location of New Zealand's largest fairy prion breeding population of fairy prions on Takapourewa Stephens Island and observations of large numbers of prions in the STB both in the breeding and non-breeding season, together with the dependence of the prions on krill (*Nyctiphanes australis*) and the occurrence of high densities of krill in the STB, show the importance of the STB for fairy prions.

POTENTIAL EFFECTS ON SEABIRDS AND SHOREBIRDS OF PROPOSED SAND MINING IN THE STB

Summary

- 63 The absence of systematic at-sea surveys of seabirds in the STB, and the absence of information on breeding success and survival of populations of seabirds that use the STB, mean that it is not possible to determine the full extent of potential adverse effects.
- 64 Seabirds that use the STB, including those that depend on the STB in the breeding season (fairy prions that breed on Takapourewa Stephens Island and the New Zealand Little Penguin subspecies of kororā) are experiencing effects of climate change, especially marine heatwaves and increased frequency and intensity of storms, that will cause population declines. Sand mining would have a cumulative effect on these populations already under stress and would exacerbate these population declines.
- 65 Sediment due to sand mining would increase turbidity in the water and reduce foraging efficiencies for kororā and for many other species of seabirds foraging below the surface of the water in the STB.

- 66 Sediment due to sand mining would reduce the availability of food for seabirds by reducing primary productivity due to reductions in the amount of light that would reach below the surface of the sea. This would in turn reduce zooplankton concentrations, leading to reductions in food availability for seabirds such as fairy prions that feed on zooplankton. Reduced zooplankton concentrations would lead to reductions in fish numbers, leading to reductions in food availability for kororā and other seabirds that feed on fish.
- 67 Adverse effects of sediment due to sand mining would be particularly strong in the Patea Shoals area. Sediment could partially or fully smother the numerous reefs that have abundant plant, invertebrate and vertebrate marine life that contribute to this area being especially important as a feeding area for fairy prions and kororā.
- 68 Kororā are already declining, and breeding populations of kororā along the coastlines and on islands offshore from the North and South islands that were lost due to reductions in food availability and foraging opportunities in the Patea Shoals and the greater STB would be permanently lost.
- 69 For fairy prions on Takapourewa Stephens Island, if there was reduced survival of adults and reduced recruitment of young birds into the breeding population over three decades, combined with ongoing and increasing reductions in food availability due to marine heatwaves and storms associated with climate change, a decline in the population could become irreversible.
- 70 Adverse effects of sand mining in the STB are likely to accelerate declines of fairy prion and kororā populations due to climate change and would increase the likelihood that these populations would become threatened with extinction.

71 The available evidence that we have indicates that the proposed sand mining in the STB for a period of 30 years would have adverse effects on populations of seabirds and would result in material harm. I consider that effects for Korora and Fairy priorns would be adverse and potentially significant.

Effects of sedimentation

72 Sedimentation is an increasing problem in the marine environment around New Zealand (Lukies et al., 2021; Office of the Prime Minister's Chief Science Advisor, 2021). Sediment entering the marine environment has adverse effects on marine ecosystems through interacting changes (Office of the Prime Minister's Chief Science Advisor, 2021). The adverse effects include:

- changing habitats on the seafloor
Sediment can settle on marine plants and seaweeds and smother them. Loss of marine plants and seaweeds leads to reductions and losses of other organisms that depend on the habitats provided by marine plants. Smothering of marine plants will also reduce primary productivity due to loss of photosynthesising organisms.
- reducing water clarity in coastal areas
Sediment that causes increased turbidity reduces the amount of light shining through water to plants, limiting their energy intake and growth, and reducing primary production.
- clogging the gills of filter feeders
Sediment will stress filter feeders, such as bivalve shellfish like pipi and tuatua, by making them slower or requiring them to use more energy. If this leads to the loss of filter feeders in an area, it would have cascading effects on that ecosystem.
- changing fish gill structure

There is evidence that turbidity causes changes in the gill structures of some species, such as snapper.

- reduction in foraging success of seabirds

Increased turbidity in the ocean reduces foraging opportunities for seabirds.

73 Subtidal reef communities, such as those on the Patea Shoals, are one of the most productive habitats in temperate marine ecosystems (Schiel and Foster, 1986). A review of New Zealand studies of the effects of sedimentation on species associated with reefs found that all studies showed negative effects of sedimentation (Shears and Babcock, 2007).

74 Penguins, Procellariiformes, gannets, terns and shags plunge dive or pursue prey below the surface of the water (Shealer, 2002), so their foraging is adversely affected by increased turbidity in the water (Chambers et al., 2011; Lukies et al., 2021; Shealer, 2002).

75 Although data are not available on relationships between turbidity levels and seabird foraging efficiency for seabirds that feed in the STB, a study of kororā showed that a core foraging zone for the species was where turbidity was lower than elsewhere (Kowalczyk *et al.*, 2015).

76 Storms with their associated increased water turbidity can lead to reduced survival of kororā (Agnew et al., 2015) and to reduced breeding success (Agnew et al., 2016). Kororā at Oamaru leave the area when the water offshore is visibly discoloured (Agnew et al., 2015) and do not return until the water is no longer brown (Agnew et al., 2015). This is a clear adverse effect of increased turbidity on kororā.

77 Most fish are visual foragers (Jönsson et al., 2013) and increased turbidity (reduced visibility) can decrease feeding success and reduce the abundance of fish (Lunt and Smee, 2015). An increase in turbidity and hence reduction in water visibility would adversely affect the foraging of

seabirds both directly, by reducing the ability of the birds to see and catch fish, and indirectly by reducing the availability of prey fish which themselves would be adversely affected by a reduction in water visibility.

78 An increase in water turbidity can lead to a reduction in availability of prey for seabirds and hence in the ease of prey capture (Braby et al., 2011; Finney et al., 1999; Taylor, 1983). A sediment plume from sand mining would, in addition to reducing foraging efficiencies for seabirds, also reduce food availability. Increased sediment concentrations in the water would reduce the amount of light in the water column and hence would reduce primary production (photosynthesis by phytoplankton). This would lead to reductions in concentrations of zooplankton that feed on phytoplankton. The availability of food for seabirds would therefore be reduced due to reductions in zooplankton and reductions in fish that depend on zooplankton.

79 Reductions in food availability for seabirds feeding in the Patea Shoals area would, in addition to reductions in primary productivity due to reduced light levels in the water, also occur due to loss of habitat for fish associated with reductions in plant species on the reefs due to sediment covering the plants, disruptions of nutrient cycles, and reductions in the availability of fish as prey for seabirds.

Effects of artificial lights

80 Many species of seabirds feed mostly at night (Imber, 1975), especially those in the family Procellariidae (shearwaters, fulmarine petrels, gadfly petrels, and prions), the most numerous seabirds in the STB. Studies of several of these seabirds found that 80-100% of their prey are bioluminescent (Imber, 1975). Evidence from these studies shows that such species take bioluminescent animals in preference to non-bioluminescent ones. In essence, species that feed on bioluminescent prey are instinctively attracted to light sources and so are especially vulnerable to being attracted by artificial lights at night, particularly when young (Imber, 1975).

81 Light pollution from artificial lights at night affects seabirds at individual, population, and species levels (Montevecchi, 2006). Gilmour et al. (2023) table 73 species of seabird affected by light pollution, 75% of which were petrels, prions, shearwaters and storm petrels, including 8 species present in the STB (broad-billed prion, Salvin's prion, black petrel, blue petrel, Gould's petrel, soft-plumaged petrel, short-tailed shearwater and sooty shearwater).

82 The order of seabirds most affected by artificial light at night is the Procellariiformes (Rodriguez et al., 2017). The STB is an important feeding area for fairy prions and other Procellariiforme species. 44 taxa of seabirds in the order Procellariiformes are likely to be present in the STB and hence vulnerable to attraction to light on mining vessels.

Adverse effects due to sand mining would exacerbate seabird declines due to marine heatwaves and climate change

83 In 2012 NIWA assessed the relative impact of 65 potentially hazardous human activities, termed threats, that may affect marine habitats within New Zealand territorial seas and the 200 nautical mile exclusive economic zone (MacDiarmid *et al.*, 2012). The greatest threats to New Zealand marine habitats were identified as ocean acidification, followed by rising sea temperatures associated with global climate change. Increased sedimentation and bottom trawling were third equal threats.

84 Seabirds are declining at a rate faster than any other avian group (Croxall *et al.*, 2012) and over half of the 314 seabird species for which the population trend is known are in decline (Phillips *et al.*, 2023). The top three causes of population declines in seabirds are climate change, bycatch in fisheries, and invasive alien species (Dias et al., 2019). (Dias et al., 2019). A New Zealand example is the sooty shearwater, for which a recent analysis found that sustainability of the New Zealand tītī population will be most influenced by climate (McKechnie *et al.*, 2020).

85 The recent mortality of fairy prions in the STB during a marine heatwave (see paragraph 59) is an example of adverse effects of climate change on seabirds in the STB. These effects are rapidly becoming more pronounced, making populations of seabirds that use the STB more vulnerable to adverse effects of sand mining than was appreciated in 2017.

COMMENTS ON THE EVIDENCE OF DR THOMPSON

86 I provide the following comments on the evidence of Dr Thompson.

87 At Paragraph [11], Dr Thompson states:

"11. Since my evidence of December 2016, there has been no new or substantive information produced on the abundance and distribution of seabirds and shorebirds in and adjacent to the STB".

- a. In 2017, I presented in my oral evidence results from tracking of kororā from Motuara Island in the Marlborough Sounds that showed that kororā swam from Motuara Island to the Patea Shoals and to other areas of sea off the Taranaki coast. These results provide information on the distribution of kororā in the STB. The results (see paragraphs 47 - 50) were published in 2017⁴⁰. In 2020, I conducted tracking studies of kororā, with results showing that korora from Mana Island swam long distances north into the STB (see paragraphs 51 and 52).
- b. Additionally, since December 2016 there are 6 ½ more years of records of seabirds and shorebirds in the STB available in the eBird database.

88 At Paragraph [13] Dr Thompson states:

"13. The STB supports a relatively modest seabird assemblage, in

⁴⁰ Published in Poupart *et al.*, 2017.

terms of number of species utilising the area, compared to the approximately 162 seabird taxa reported from throughout the New Zealand region, but detailed, systematic and quantitative information on the at-sea distribution of virtually all species is currently lacking for the STB. "

- a. The statement that the STB supports a relatively modest seabird assemblage is not correct. The STB is a seabird hotspot used by approximately half of the seabird species recorded in New Zealand waters. 76 seabird taxa are likely to occur in the STB. 21 of these species are threatened with extinction and 32 of these species are at risk of extinction. For shorebirds that are not included in the seabird list, 34 species are likely to occur in the STB, including 9 species threatened with extinction and 8 species at risk of extinction (see paragraphs 16 - 30).
- b. 55% of the species of albatrosses and petrels for which the New Zealand Government has undertaken, through the international Agreement on the Conservation of Albatrosses and Petrels, to achieve and maintain a favourable conservation status, are likely to be present in the STB.

89 At Paragraph [[14], Dr Thompson states:

"14. Nevertheless, based on published information, sightings information publicly available from online sources (for example, the 'eBird' website: see <http://ebird.org/content/newzealand/>) and unpublished tracking information held by NIWA. Table 1 summarises the seabird assemblage likely to occur in the STB at some time during the year. Taxa have been ranked according to the NZTCS conservation status. This list is not intended to be definitive and additional taxa could occur in the region from time to time."

- a. Table 1 in Dr Thompson's evidence has 45 seabird taxa and 14 shorebird taxa likely to occur in or near the STB. Tables 1 and 2 (see Appendix C and Appendix D) of my evidence list 76 seabird taxa and 34 shorebird taxa likely to occur in or near the STB.

90 At Paragraph [15], Dr Thompson states:

"15. Based on NZTCS classifications, three seabird taxa classified as 'Threatened – Nationally Critical' are likely to occur in the STB (Antipodean albatross, Gibson's albatross and Salvin's albatross), and a further eight Threatened taxa (either 'Nationally Endangered' or 'Nationally Vulnerable' are also likely to occur in the area (Table 1). Additionally, a further 24 taxa classified as one of four 'At Risk' categories, and two further taxa classified as 'Vulnerable', based on 'Red List' classifications, could also occur in the STB (Table 1)."

- a. Dr Thompson's seabird evidence has 11 taxa in the NZTCS threatened classification, 24 taxa in the NZTCS at risk classification, and two additional taxa in the IUCN Red List threatened classification. My evidence has 14 taxa in the NZTCS threatened classification, 32 taxa in the NZTCS at risk classification, and seven additional taxa in the IUCN Red List threatened classification (see paragraph 26, Appendix C and paragraph 27).

91 At Paragraph [17], Dr Thompson states:

"17. Additionally, the coastal environment bordering the STB supports a range of shorebirds that are unlikely to occur at sea. Based largely on online and publicly available sightings information, Table 1 also summarises shorebird taxa occurring along the coast of the STB, ranked according to their NZTCS conservation status classifications. Based on NZTCS classifications, two shorebird taxa classified as 'Threatened – Nationally Increasing' are likely to occur coastally, adjacent to the STB (wrybill and northern New Zealand dotterel). A further seven taxa

classified as one of four 'At Risk' categories also occur in the STB coastal environment (Table 1)."

- a. Dr Thompson's shorebird evidence has 2 taxa in the NZTCS threatened classification and 7 taxa in the NZTCS at risk classification. My evidence has 5 taxa in the NZTCS threatened classification, 8 taxa in the NZTCS at risk classification, and four additional taxa in the IUCN Red List threatened classification (see paragraph 28 and Appendix E).

92 At Paragraph [18], Dr Thompson states:

"The STB does not support large breeding colonies for any species, ..."

- a. This statement is not correct. More than 90% the New Zealand population of fairy prions breed on Takapourewa Stephens Island and forage in the STB, with an estimate in 2010 of 1.4 million breeding pairs on the island (see paragraph 54).
- b. Significant numbers of fairy prions and other seabird species that breed on other islands in the Marlborough Sounds seabird and on northern Cook Strait islands will also forage in the STB. I have estimated that at least 800 kororā breed on Mana Island (J.F. Cockrem, unpubl. obs.), and my tracking studies have shown that Mana Island kororā feed in the STB (see paragraph 52).

93 At Paragraph [19], Dr Thompson states:

"19. Seabirds could potentially be affected by the proposal through: displacement from the mining site (physical exclusion), reduced foraging efficiency (via increased turbidity from the sediment plume),

noise, fuel or oil pollution and through effects of artificial nocturnal lighting."

- a. This paragraph has omitted mention of reduced food availability for seabirds that would arise due to sediment from sand mining. Increased sediment concentrations would reduce light levels in the water (see paragraph 80), which would lead to reduced photosynthesis in phytoplankton and to reduced primary productivity. This in turn would lead to reduced zooplankton and fish abundance and hence to reduce food availability for seabirds.

94 At Paragraph [20], Dr Thompson states:

20. Assuming a worst-case scenario, seabirds could be physically excluded from the proposed project area (PPA) entirely, and could similarly be unable to exploit the water column below the mining vessel and for an extended area beyond the location of mining. This might come about through a reluctance of seabirds to approach the mining vessel. However, all seabirds exploit relatively large areas and have relatively large distributions and ranges (see paragraphs 30 and 31) relative to the PPA. Furthermore, while seabirds may feed within the PPA from time to time, seabird prey will vary in both space and time, and are as likely to occur outside the PPA as within the PPA. Given the dynamic nature of prey availability, the ability of seabirds to search for prey over relatively large spatial scales and the small area of the PPA relative to the foraging ranges of seabirds, exclusion from the PPA will have a negligible effect on seabirds.

- a. The "extended area beyond location of mining", referred to in the first sentence of Thompson's paragraph 20, where turbidity would be high and reductions in light levels pronounced that seabird foraging would be

impossible, would change from day to day as the mining site moves within the consent area.

- b. I refer to the evidence of Dr Greer, dated 06 October 2023 at [19] where he states that the worst case modelling is not fit for purpose. Given this uncertainty, the worst case modelling cannot be relied upon to identify the likely area in which birds may be impacted by the sediment plume.
- c. I disagree with the statement that "exclusion from the PPA will have a negligible effect on seabirds". I consider that exclusion of seabirds from the PPA will have a more than minor effect on seabirds. There remains uncertainty around the numbers of seabirds in this area and therefore around the degree of effect.
- d. The available information shows that the PPA is within an area of the STB that is important for foraging of kororā and fairy prions, with more than 100 000 prions seen on one occasion within 10 km of the PPA. The PPA is within Patea Shoals, and the Patea Shoals are an important feeding area for kororā and fairy prions, so the statement that "exclusion from the PPA would have a negligible effect on seabirds" is not consistent with the available information. I consider that effects on fairy prions and kororā would be adverse and could be significant.
- e. Sediment could partially or fully smother reefs in the Patea Shoals, leading to reductions in plant species on the reefs, loss of habitat for fish, disruptions of nutrient cycles, and reductions in the availability of zooplankton and fish as prey for seabirds.

- f. If seabirds had to move to other areas because of turbidity, then this would itself be an adverse effect. Food for seabirds is available in patches and is not uniformly distributed⁴¹. The Patea Shoals area is clearly significant as a foraging area for kororā and for fairy prions. If seabirds were displaced from this area, there would not be an alternative foraging area available with the same characteristics, so foraging opportunities for seabirds would be lost.

95 At Paragraph [23], Dr Thompson states:

23. Based on this, increases in SSCs resulting from mining-derived material are unlikely to make a substantial difference to the foraging ability of seabirds exploiting prey in the water column.

- a. I disagree. It has been noted that a sediment plume would reduce foraging efficiencies for seabirds foraging below the surface of the water and would reduce food availability for seabirds. It has also been noted that increased turbidity, and reduced light levels in water, due to the sediment plume would extend for distances well over 100 km.
- b. The increase in turbidity above background levels is cumulative for a period of 30 years. Considered against existing pressures on seabirds means that effects are likely to be more than minor and potentially adverse or significant (notably for Korora and fairy priors for which I consider effects would be adverse and potentially significant).

⁴¹ Weimerskirch, 2007; Benoit-Bird et al, 2013; Balance et al., 2019

- c. The extent of the adverse effects on seabirds of increased SSCs due to sand mining cannot be predicted accurately as there are no data on relationships between SSC and foraging efficiency for the seabirds that would be affected.
- d. I disagree with the statement that prey available to seabirds would essentially be the same in the presence of mining derived sediment. Sand mining will create large sediment plumes that will extend over many square kilometres of sea in the STB and will reduce food availability for seabirds in those areas (see paragraphs 76 to 81). As previously stated, reductions in food availability for seabirds would be particularly strong in the Patea Shoals area. The Patea Shoals are unique for New Zealand as a large area of relatively shallow water with numerous reefs (Morrison *et al.*, 2022). If seabird foraging efficiencies were reduced and prey availability was also reduced for seabirds that forage in this area, there would not be alternative area with the same characteristics available for them, so the adverse effects of sand mining on these seabirds would be significant.

96 At Paragraph [29], Dr Thompson states:

29. *While it is well known that artificial nocturnal light attracts many species of seabirds, the majority of diurnally-active seabirds appear not to exhibit marked attraction to artificial light, whereas light can potentially be a problem for nocturnal species. Furthermore, attraction to artificial nocturnal light sources at sea tends to be a problem for seabirds during bad weather (particularly with poor visibility), when the light source is close to breeding colonies and when the light source is directed upwards or outwards, as opposed to downwards.*

- a. I agree that nocturnal birds are affected more than diurnally active seabirds (who largely forage during daylight hours). I also agree that effects on nocturnal seabirds are worse during bad weather and if the light source is close to breeding colonies and if the light source is directly upwards and outwards as opposed to downwards. Lights will also have adverse effects if they are located close to feeding areas. The degree of effect from light source is dependent on the location, duration, and intensity of the source. Light effects are also cumulative.
- b. The order of seabirds most affected by artificial light at night is the Procellariiformes (Rodriguez *et al.*, 2017). The order Procellariiformes includes albatrosses and mollymawks, storm petrels, and birds in the family Procellariidae. Birds in this family (shearwaters, fulmarine petrels, gadfly petrels, and prions), which form the largest numbers of birds in the STB, feed mostly at night (Imber 1975) and are vulnerable to attraction to artificial light at night (see paragraphs 82 to 84).

97 At Paragraph [30], Dr Thompson states:

30. While it is possible that the vessel's lights may attract nocturnal seabird species, the remoteness of the PPA from major seabird breeding colonies and standard mitigation protocols, as detailed in TTR's draft Seabird Effects Mitigation and Management Plan (SEMMP) should ensure the impact from this effect on seabirds will be less than minor. Mitigation measures include, but are not limited to, minimising the use of nocturnal light as far as is practicable, directing or shielding light sources to minimise light spill from the vessel and ensuring all windows and port holes are covered at night by blinds to prevent light emanating).

- a. I disagree that the effect of light on seabirds will be less than minor. There is a high risk of seabird mortality due to lights on mining vessels in the PPA.
- b. Artificial lights at night can cause high mortality of seabirds, and disruption of natural light regimes by light pollution has many biological impacts on seabirds at individual, population, and species levels (see paragraphs 82 to 84).
- c. The sighting of prions, and other evidence about prions (see paragraphs 54 to 63), shows that there is the possibility of large mortalities of prions attracted to lights on mining vessels.

Scale of effects with respect to seabirds (Thompson paragraphs 31 to 33)

98 In paragraphs 31, 32 and 33, Dr Thompson has asserted that adverse effects on seabirds due to sand mining would be negligible and that the scale of the adverse effects on seabirds of sand mining in the PPA would be limited to an area of 78.55 km². I disagree.

99 In paragraph [31], Dr Thompson states:

31. Seabirds generally, but particularly albatrosses and closely related species, operate at relatively large scales. When breeding, foraging trips of hundreds to thousands of kilometres are typical, and it follows therefore that at the population level seabirds are able to exploit marine resources over vast areas, perhaps for the widest-ranging taxa in the order of millions of square kilometres.

- a. I disagree with the statement that at the population level seabirds are able to exploit marine resources over vast areas.

- b. A core principle in seabird biology is that seabirds feed on prey that is in patches⁴². Prey is not distributed randomly in the sea, and seabirds of different sizes have different foraging ranges, so it is not correct to make the generalisation that seabirds can "exploit marine resources over vast areas".
- c. Seabirds are called central place foragers as they have to travel from their breeding site, find food and return to the breeding site to feed chicks. Seabirds do not set off randomly from their breeding site to find food for their chicks, as food is not distributed randomly in the sea. Instead, seabirds must find prey patches in the ocean that are close enough to the breeding site for the seabirds to be able to bring food to the chicks frequently enough for the chicks to grow and survive.
- d. Prey for kororā, like prey for other species of seabird, are not randomly distributed in the sea. A striking example of kororā foraging for prey in a localised area is tracking data for a kororā that during the breeding season swam 150 km directly from Motuara Island in the Marlborough Sounds to the Patea Shoals. The kororā spent several days feeding at the Shoals, then swam directly back to its breeding site (see paragraphs 47 to 50). My own experience of tracking foraging trips of kororā is that individual birds have distinctive foraging patterns and do not utilise the sea uniformly in a semi-circular area from their breeding sites.

100 In paragraph [33], Dr Thompson states:

⁴² Balance *et al.*, 2019; Weimerskirch, 2007.

33. *Based on the worst-case modelling, the average spatial extent of surface and near-bottom median SSC above 2 mg/L due to mining is 78.55 km² (Dr MacDiarmid's supplementary evidence). Even assuming little penguins avoid this area completely, the 'lost' area only represents approximately 3% of the area a little penguin could exploit. It should also be noted that the SSC of 2 mg/L is a relatively low threshold, but the lowest SSC found to be avoided by pelagic fish (see Dr MacDiarmid's evidence) – it is possible that little penguins could still forage successfully in water with this SSC level. Comparing the 78.55 km² area with a SSC of 2 mg/l with the much larger areas that can be exploited by pelagic, flying seabirds, it is clear that even removing the affected area completely will have a negligible effect.*

- a. I disagree with the statement that an area of 78.55 km² would be the only area of sea in which kororā and other seabirds would be adversely affected by sediment due to sand mining. I refer to the evidence of Mr Greer, dated 06 October 2023, with regard to the worst case plume modelling.
- b. The assertion that a level of SSC of 2 mg/L is a threshold for whether or not turbidity due to sediment would have adverse effects on seabird foraging is arbitrary. There are no data available on seabird foraging efficiencies in relation to turbidity levels, and it is not valid to use an arbitrary threshold SSC in relation to adverse effects of turbidity on seabird foraging.

101 In paragraph [37], Dr Thompson states:

37. *It is my opinion, for all the reasons summarised above and covered in my 2017 evidence, that the proposed mining operation will not adversely affect any of the relevant seabird species at a population level. However, that is not dependent on a condition expressing that requirement — it is an outcome of the limited potential for effects, and*

the various forms of mitigation that will result from other conditions (e.g. limits on discharge of sediment, limits on lighting, and measures to address any potential spills). In my view, part a of Condition 9 expresses the outcome as if it will be able to be proved that no population level effect has occurred, and this is not only challenging, but misleading about what is currently scientifically possible.

- a. I disagree with the statement that that the proposed mining operation will not affect seabird species at a population level.
- b. Seabirds that use the STB, including those that depend on the STB in the breeding season (fairy prions that breed on Takapourewa Stephens Island and the New Zealand Little Penguin subspecies of kororā) are experiencing effects of climate change, especially marine heatwaves and increased frequency and intensity of storms. We do not have enough information on the effects of the proposal to determine to say that effects will not occur at a population level. Sand mining will likely exacerbate existing population declines.

102 In paragraph [45] (this paragraph relates to Marine Consent Condition
48 of the DMC 2017 decision), Dr Thompson states:

45. Condition 48 outlines the Pre-commencement Environmental Monitoring Plan, which includes the provision for a minimum of two years monitoring of seabirds. Such monitoring should ideally take the form of a structured and systematic boat-based survey, following well-established protocols to record seabird occurrence, that covers an area encompassing not only the PPA but a substantial additional area beyond the PPA allowing seabird use of the PPA to be placed in a regional context. The survey should be repeated at least four times per year to capture temporal variation in seabird use of the PPA specifically, and the STB more generally. In my view this should be

sufficient to establish seabird species occurrence within the STB, species abundances and how these vary in both space and time.

- a. I disagree with the statement that monitoring of seabirds for a minimum of two years, with a focus on the PPA, and boat surveys alone without monitoring at breeding sites, would be sufficient.
- b. Most of the seabirds in question are relatively long-lived, slow-reproducing species with delayed maturity, breeding for the first time only several years after fledging. As such, they exhibit 'slow' population dynamics so that any changes in their demographic parameters (nesting success; adult, sub-adult and juvenile survival; age at first reproduction), including those resulting from changes in their marine environment, will generally take many years to become apparent.
- c. There are marked changes from year to year in wind, precipitation, and the frequency and intensity of storms. There are also marked changes, for the STB and for all New Zealand seas, in sea surface temperatures (including the duration and intensity of marine heatwaves), patterns and levels of primary productivity, and concentrations and distributions of zooplankton. The changes from year to year are rapidly becoming more pronounced due to climate change.
- d. The minimum period of monitoring needed for a seabird population is 10 years (Montevecchi, 2023; Young and VanderWerf, 2023). Monitoring of seabirds in the STB should include surveys at sea and detailed monitoring at breeding sites of fairy prions and kororā. Surveys at sea should be conducted four to six times per year over long

transects that covered the entire wider STB area.

Monitoring at breeding sites of fairy prions and kororā should include the collection of data to determine, each year, population size, survival of adults, and recruitment of young birds into a breeding population.

103 In paragraph [47] (this paragraph relates to Marine Consent Condition 48 of the DMC 2017 decision), Dr Thompson states:

47. Overall, the condition and associated plans mentioned in paragraphs 34-44 provide adequate safeguards for the protection of seabirds. However, I would suggest that condition 9, and in particular the requirement to demonstrate a lack of an adverse effect at the population level, will be extremely difficult to implement for the majority of seabird taxa.

- a. I disagree with the statement that that the conditions and associated plans in the consent conditions of the DMC 2017 decision provide adequate safeguards for the protection of seabirds. For all the reasons identified above, the conditions do not favour caution or environmental protection.

CONCLUSION

104 The South Taranaki Bight is a hotspot for seabirds. The available evidence indicates that approximately half of New Zealand seabird species (and more than 60% of New Zealand marine mammal species) are present in the STB, with at least 100 species of birds feeding in and along the shores of the STB.

105 There remains uncertainty around the numbers of seabirds in this area and therefore around the degree of effect. The extent of the adverse effects on seabirds of increased SSCs due to sand mining cannot be predicted accurately as there are no data on relationships between SSC and foraging efficiency for the seabirds that would be affected.

106 Given the existing gaps in information it is not possible to say with any certainty that the proposed conditions are able to avoid material harm.

107 The available evidence that we do have indicates that the proposed sand mining in the STB for a period of 30 years, would have adverse and cumulative adverse effects on populations of seabirds and would result in material harm. I consider that effects for Korora and Fairy priors would be adverse and potentially significant.

John Cockrem
6 October 2023

Appendix A

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Appendix B

- 1 I hold a BSc(Hons) from Massey University and a PhD from the University of Bristol.
- 2 I am a Professor of Comparative Endocrinology at Massey University, Palmerston North (0.5 FTE). The current evidence is presented in my capacity as an independent biologist and not as an employee or representative of Massey University.
- 3 I have published 118 refereed journal articles, two ebooks, and six refereed book chapters, and have more than 170 other publications. My Google Scholar h-index is 41. I have more than 5 000 citations in Google Scholar, with 10 papers that have more than 100 citations. My most highly cited first author paper has 498 citations in Google Scholar. I have given 110 seminars and invited lectures, and 37 community talks to a wide range of groups.
- 4 Elsevier is one of top five international academic publishing companies. Elsevier has a database of citation scores calculated from Scopus records for publications over the last 200 years
<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/5>. Citation scores "focus on impact (citations) rather than productivity (number of publications) and also incorporate information on co-authorship and author positions".
- 5 The Elsevier citation scores indicate the impact of each scientist on their research field. My citation score is in the top 1% of the more than 9 million scientists in the database.
- 6 I have been a visiting scientist in the United Kingdom, Sweden, Japan, and the United States. International consultancy work has been performed for the United States Navy Office of Naval Research and for the National Commission for Wildlife Conservation and Development in Saudi Arabia. National consultancy work has been performed for the Ministry of Primary Industries and the Department of Conservation. Invited plenary lectures,

conference papers and lectures have been given in New Zealand and in 20 other countries.

- 7 I am an ornithologist and penguin biologist with more than 40 years of professional experience in ornithology.
- 8 I have 35 years of experience in penguin research and have made seven trips to Antarctica to work with Adelie and emperor penguins. I have worked with hoiho (yellow-eyed penguins) and kororā in New Zealand, have published refereed journal articles and book chapters about penguins, and have made presentations at national and international penguin conferences.
- 9 The title for my current research programme is "He kororā, he tohu oranga" which means "The little penguin is the sign of life". In mātauranga Māori the success of korora populations indicates the health of the coastal environment.
- 10 I have established new nestbox colonies of kororā on Mana Island off the Porirua coast, on Kapiti Island, and at Napier Port, Port Taranaki in Golden Bay, Kaiteriteri in Tasman Bay, and on Waiheke Island in the Hauraki Gulf.
- 11 The establishment of the kororā nestbox colony on Mana Island was a project with Ngāti Toa Rangitira. This project, entitled "Kororā and coastal kaitiakitanga", was funded by a grant from the Vision Mātauranga Capability Fund of the Ministry of Business, Innovation and Employment.
- 12 Field studies of kororā, in collaboration with colleagues at Napier Port and in community groups, are being conducted to determine breeding success and survival of kororā at my six study sites. I have experience with studies of foraging areas and diving behaviour for kororā and hoiho, using tracking devices that record GPS location and diving data.
- 13 I have prepared and commented on avifauna and penguin management plans, written consent conditions for resource consent applications, and have

worked with consenting authorities to develop and revise conditions for penguin management plans.

- 14 I am often called on for media interviews in relation to penguins in New Zealand and overseas.
- 15 There were at least 133 mentions of my kororā work in news articles, public documents, and social media posts in 2021 and 2022.
- 16 Public talks on kororā have been given to community groups that range from primary school pupils in a classroom on Aotea Great Barrier Island to a TEDx talk to an audience of 1 000 people in the St James Theatre in Wellington.
- 17 Awards and distinctions that I have received include:
 - 2022 Massey University Research Medal for Exceptional Research Citizenship (Whaowhia Ngā Kete o Te Wānanga)
 - I was elected as an Honorary Fellow of the American Ornithologists' Union (AOU) in 2011. The membership category of Honorary Fellow of the AOU is defined as: "Honorary Fellows shall be limited to 100. They shall be chosen for exceptional ornithological eminence and must at the time of their election be residents of a country other than the United States or Canada".
 - In 2010 I was elected as a member of the Executive Committee of the International Ornithologists' Union (IOU). The nomination letter from the President of the IOU stated: "Your election was based on the nomination and recommendation of the Past-President of the IOU, on the excellence of your scientific work, and on your involvement in promoting ornithology".
 - Visiting Research Professor, Kyushu University, Fukuoka, Japan, 2015.
 - Fulbright New Zealand Scholar Award, 2014 and 2015.
 - Affiliate Faculty member, University of Montana, United States, 2014.
 - Chair of the Scientific Programme Committee for the 25th International Ornithological Congress, Campos do Jordao, Brazil, 2008 and 2009.
 - Japan Society for the Promotion of Science Fellowship, 2008.

Appendix C

Threat status and classifications of birds in the South Taranaki Bight

A. The New Zealand Threat Classification System

- 1 The New Zealand Threat Classification System is used by the Department of Conservation to assess the threat status of New Zealand taxa (species, subspecies and other taxonomic categories⁴³. The four levels of threat status of native New Zealand taxa are threatened, at risk, non-resident, and not threatened (Michel, 2021). There are four classifications of threatened species (threatened - nationally critical, threatened - nationally endangered, threatened - nationally vulnerable, and threatened - nationally increasing). There are four classifications of at risk species (at risk - declining, at risk - relict, at risk - naturally uncommon and at risk - recovering) and three classifications of non-resident species (non-resident - migrant, non-resident - coloniser and non-resident - vagrant). The most recent assessment of the conservation status of New Zealand birds, using the New Zealand Threat Classification System, was published in 2021 (Robertson *et al.*, 2021).

B. The IUCN Red List of Threatened Species

- 2 The International Union for Conservation of Nature (IUCN) Red List of Threatened Species⁴⁴ is internationally recognised as the authoritative information source on the global extinction risk status of animal, fungus and plant species (IUCN, 2023).
- 3 The Red List has seven categories for taxa that have free-living populations, plus categories for taxa that are extinct and taxa that are extinct in the wild. The three categories of threatened taxa are critically endangered (CR), endangered (E) and vulnerable (V). Taxa in these categories are considered to have extremely high (CR), very high (E) or high (V) risks of extinction. The near

⁴³ <https://www.doc.govt.nz/about-us/science-publications/conservation-publications/nz-threat-classification-system>).

⁴⁴ (<https://www.iucnredlist.org>).

threatened (NT) category applies to taxa that are close to qualifying for or likely to qualify for a threatened category in the near future. The least concern (LC) category applies to taxa that do not qualify for one of the threatened categories (CR, E or V) or for the are close to qualifying for the near threatened category. Taxa classified as LC may nonetheless be declining, and hence may become near threatened or threatened in future. For example, 39% of the 205 seabird species in the Least Concern category are declining (Young and Ballance, 2023a). Two further categories are data deficient and not evaluated.

- 4 The Red List website has, for each recognised taxa, detailed and comprehensive information on taxonomy, the assessment process for the taxa, current population size and distribution, threats, current conservation actions and the current status of the taxa, together with a reference list. An example of this information, for the wandering albatross, is available at Birdlife International⁴⁵.

⁴⁵ <https://www.iucnredlist.org/species/22698305/132640680> (BirdLife International, 2018).

Appendix D

Table 1. Seabirds likely to occur in the South Taranaki Bight. The table includes 64 taxa identified by Scofield (2014) and 12 additional species not in Scofield's list but which have South Taranaki Bight records in eBird⁴⁶.

Common name	Scientific name	NZ threat status	IUCN status
Antipodean albatross	<i>Diomedea antipodensis antipodensis</i>	Threatened - nationally critical	Endangered
Gibson's albatross	<i>Diomedea antipodensis gibsoni</i>	Threatened - nationally critical	Endangered
Salvin's mollymawk	<i>Thalassarche salvini</i>	Threatened - nationally critical	Vulnerable
Black-fronted tern	<i>Chlidonias albobristatus</i>	Threatened - nationally endangered	Endangered
New Zealand king shag	<i>Leucocarbo carunculatus</i>	Threatened - nationally endangered	Vulnerable
Yellow-eyed penguin	<i>Megadyptes antipodes</i>	Threatened - nationally endangered	Endangered
Caspian tern	<i>Hydroprogne caspia</i>	Threatened - nationally vulnerable	Least concern
Grey-headed mollymawk	<i>Thalassarche chrysostoma</i>	Threatened - nationally vulnerable	Endangered
Hutton's shearwater	<i>Puffinus huttoni</i>	Threatened - nationally vulnerable	Endangered
Black petrel	<i>Procellaria parkinsoni</i>	Threatened - nationally vulnerable	Vulnerable
Northern royal albatross	<i>Diomedea sanfordi</i>	Threatened - nationally vulnerable	Endangered
Southern royal albatross	<i>Diomedea epomophora</i>	Threatened - nationally vulnerable	Vulnerable
Spotted shag	<i>Phalacrocorax punctatus</i>	Threatened - nationally vulnerable	Least concern
Subantarctic skua	<i>Stercorarius antarcticus</i>	Threatened - nationally vulnerable	Least concern
Black-billed gull	<i>Chroicocephalus bulleri</i>	At risk - declining	Near threatened

⁴⁶ (<https://ebird.org/newzealand/home>).

Common name	Scientific name	NZ threat status	IUCN status
Buller's mollymawk	<i>Thalassarche bulleri</i>	At risk - declining	Near threatened
Buller's shearwater	<i>Ardenna bulleri</i>	At risk - declining	Vulnerable
Fiordland crested penguin	<i>Eudyptes pachyrhynchus</i>	At risk - declining	Near threatened
Light-mantled sooty albatross	<i>Phoebastria palpebrata</i>	At risk - declining	Near threatened
Little penguin	<i>Eudyptula minor</i>	At risk - declining	Least concern
Red-billed gull	<i>Chroicocephalus novaehollandiae</i>	At risk - declining	Least concern
Sooty shearwater	<i>Ardenna grisea</i>	At risk - declining	Near threatened
White-capped mollymawk	<i>Thalassarche cauta</i>	At risk - declining	Near threatened
White-fronted tern	<i>Sterna striata</i>	At risk - declining	Near threatened
Antarctic prion	<i>Pachyptila desolata</i>	At risk - relict	Least concern
Black shag	<i>Phalacrocorax carbo</i>	At risk - relict	Least concern
Broad-billed prion	<i>Pachyptila vittata</i>	At risk - relict	Least concern
Common diving petrel	<i>Pelecanoides urinatrix</i>	At risk - relict	Least concern
Cook's petrel	<i>Pterodroma cookii</i>	At risk - relict	Vulnerable
Fairy prion	<i>Pachyptila turtur</i>	At risk - relict	Least concern
Flesh-footed shearwater	<i>Puffinus carneipes</i>	At risk - relict	Near threatened
Fluttering shearwater	<i>Puffinus gavia</i>	At risk - relict	Least concern
Grey petrel	<i>Procellaria cinerea</i>	At risk - relict	Near threatened
Little shag	<i>Microcarbo melanoleucos</i>	At risk - relict	Least concern
Mottled petrel	<i>Pterodroma inexpectata</i>	At risk - relict	Near threatened
White-faced storm petrel	<i>Pelagodroma marina</i>	At risk - relict	Least concern
Campbell albatross	<i>Thalassarche</i>	At risk - naturally	Vulnerable

Common name	Scientific name	NZ threat status	IUCN status
Cape petrel	<i>impavida</i> <i>Daption capense</i>	uncommon At risk - naturally uncommon	Least concern
Fulmar prion	<i>Pachyptila crassirostris</i>	At risk - naturally uncommon	Least concern
Little black shag	<i>Phalacrocorax</i> <i>sulcirostris</i>	At risk - naturally uncommon	Least concern
Soft-plumaged petrel	<i>Pterodroma mollis</i>	At risk - naturally uncommon	Least concern
Westland petrel	<i>Procellaria westlandica</i>	At risk - naturally uncommon	Endangered
Little shearwater	<i>Puffinus assimilis</i>	At risk - recovering	Least concern
Northern giant petrel	<i>Macronectes halli</i>	At risk - recovering	Least concern
Pied shag	<i>Phalacrocorax varius</i>	At risk - recovering	Least concern
Sooty tern	<i>Onychoprion fuscatus</i>	At risk - recovering	Least concern
Antarctic fulmar	<i>Fulmarus glacialisoides</i>	Migrant	Least concern
Arctic skua	<i>Stercorarius</i> <i>parasiticus</i>	Migrant	Least concern
Arctic tern	<i>Sterna paradisaea</i>	Migrant	Least concern
Blue petrel	<i>Halobaena caerulea</i>	Migrant	Least concern
Gould's petrel	<i>Pterodroma leucoptera</i>	Migrant	Vulnerable
Kerguelen petrel	<i>Lugensa brevirostris</i>	Migrant	Least concern
Little tern	<i>Sternula albifrons</i>	Migrant	Least concern
Long-tailed skua	<i>Stercorarius</i> <i>longicaudus</i>	Migrant	Least concern
Pomarine skua	<i>Stercorarius</i> <i>pomarinus</i>	Migrant	Least concern
Salvin's prion	<i>Pachyptila salvini</i>	Migrant	Least concern
Short-tailed shearwater	<i>Ardenna tenuirostris</i>	Migrant	Least concern
South Polar skua	<i>Stercorarius</i>	Migrant	Least

Common name	Scientific name	NZ threat status	IUCN status
	<i>maccormicki</i>		concern
Southern giant petrel	<i>Macronectes giganteus</i>	Migrant	Least concern
Thin-billed prion	<i>Pachyptila belcheri</i>	Migrant	Least concern
Wandering albatross	<i>Diomedea exulans</i>	Migrant	Vulnerable
White-winged black tern	<i>Chlidonias leucopterus</i>	Migrant	Least concern
Black-browed mollymawk	<i>Thalassarche melanophris</i>	Coloniser	Least concern
Common noddy	<i>Anous stolidus</i>	Coloniser	Least concern
Gull-billed tern	<i>Gelochelidon nilotica</i>	Coloniser	Least concern
Antarctic petrel	<i>Thalassoica antarctica</i>	Vagrant	Least concern
Brown booby	<i>Sula leucogaster</i>	Vagrant	Least concern
Common tern	<i>Sterna hirundo</i>	Vagrant	Least concern
Emperor penguin	<i>Aptenodytes forsteri</i>	Vagrant	Near threatened
Crested tern	<i>Thalasseus bergii</i>	Vagrant	Least concern
Australasian gannet	<i>Sula serrator</i>	Not threatened	Least concern
Black-winged petrel	<i>Pterodroma nigripennis</i>	Not threatened	Least concern
Grey-faced petrel	<i>Pterodroma gouldi</i>	Not threatened	Least concern
Southern black-backed gull	<i>Larus dominicanus</i>	Not threatened	Least concern
White-chinned petrel	<i>Procellaria aequinoctialis</i>	Not threatened	Vulnerable
White-headed petrel	<i>Pterodroma lessonii</i>	Not threatened	Least concern

Appendix E

Table 2. Shorebird species not included in Table 1 that are known to occur or, for some of the rare species likely to occur, along the coastline of the South Taranaki Bight.

Common name	Scientific name	NZ threat status	IUCN status
Kaki/black stilt	<i>Himantopus novaezelandiae</i>	Threatened - nationally critical	Critically endangered
Kōtuku/white heron	<i>Ardea alba</i>	Threatened - nationally critical	Least concern
Shore plover	<i>Thinornis novaeseelandiae</i>	Threatened - nationally critical	Endangered
Reef heron	<i>Egretta sacra</i>	Threatened - nationally endangered	Least concern
Wrybill	<i>Anarhynchus frontalis</i>	Threatened - nationally increasing	Vulnerable
Bar-tailed godwit	<i>Limosa lapponica</i>	At risk - declining	Near threatened
Banded dotterel	<i>Charadrius bicinctus</i>	At risk - declining	Near threatened
Red knot	<i>Calidris canutus</i>	At risk - declining	Near threatened
South Island pied oystercatcher	<i>Haematopus finschi</i>	At risk - declining	Least concern
Black-fronted dotterel	<i>Elseyaornis melanops</i>	At risk - naturally uncommon	Least concern
Royal spoonbill	<i>Platalea regia</i>	At risk - naturally uncommon	Least concern
New Zealand dotterel	<i>Charadrius obscurus</i>	At risk - recovering	Critically endangered
Variable oystercatcher	<i>Haematopus unicolor</i>	At risk - recovering	Least concern
Cattle egret	<i>Bubulcus ibis</i>	Migrant	Least concern
Pacific golden plover	<i>Pluvialis fulva</i>	Migrant	Least concern

Common name	Scientific name	NZ threat status	IUCN status
Red-necked stint	<i>Calidris ruficollis</i>	Migrant	Near threatened
Ruddy turnstone	<i>Arenaria interpres</i>	Migrant	Least concern
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	Migrant	Vulnerable
Eurasian whimbrel	<i>Numenius phaeopus</i>	Migrant	Least concern
Glossy ibis	<i>Plegadis falcinellus</i>	Coloniser	Least concern
Black-tailed godwit	<i>Limosa limosa</i>	Vagrant	Near threatened
Common greenshank	<i>Tringa nebularia</i>	Vagrant	Least concern
Common sandpiper	<i>Tringa hypoleucos</i>	Vagrant	Least concern
Eastern curlew	<i>Numenius madagascariensis</i>	Vagrant	Endangered
Grey-tailed tattler	<i>Tringa brevipes</i>	Vagrant	Near threatened
Great knot	<i>Calidris tenuirostris</i>	Vagrant	Endangered
Little egret	<i>Egretta garzetta</i>	Vagrant	Least concern
Pacific heron	<i>Ardea pacifica</i>	Vagrant	Least concern
Terek sandpiper	<i>Xenus cinereus</i>	Vagrant	Least concern
Wandering tattler	<i>Tringa incana</i>	Vagrant	Least concern
Spur-winged plover	<i>Vanellus miles</i>	Not threatened	Least concern
Pied stilt	<i>Himantopus himantopus</i>	Not threatened	Least concern
Sacred kingfisher	<i>Todiramphus sanctus</i>	Not threatened	Least concern
White-faced heron	<i>Egretta novaehollandiae</i>	Not threatened	Least concern

APPENDIX C

BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY

IN THE MATTER of the Exclusive Economic Zone and
Continental Shelf (Environmental Effects)
Act 2012

AND

IN THE MATTER of a Reconsideration of Applications by
Trans-Tasman Resources Limited (TTRL)

JOINT STATEMENT OF EXPERTS IN THE FIELD OF

EFFECTS ON SEABIRDS

Dated 20 February 2024

INTRODUCTION

1. Expert caucusing on the topic of effects on seabirds took place via videoconference on 20 February 2024.
2. The conference was attended by the following experts:
 - a) Dr David Thompson (TTRL)
 - b) Dr John Cockrem (KASM & Greenpeace)
3. Chris Simmons (ChanceryGreen) acted as facilitator.
4. Jillian Kennemore (EPA) acted as scribe.

CODE OF CONDUCT

5. The experts confirm that we have read the Environment Court Code of Conduct 2023 and agree to comply with it. We confirm that the issues addressed in this Joint Statement are within our area of expertise, unless stated otherwise.

SCOPE OF STATEMENT

6. In accordance with DMC Minute and Directions 10:
 - a) The Joint Statement on effects on seabirds dated 16 February 2017 (“2017 Joint Statement”) has formed the starting point for the caucusing session.
 - b) We have endeavored to:
 - (i) comment on whether there is any new or updating evidence that changes the previous positions; and
 - (ii) if so, identify what the evidence is and how it changes the positions.
7. In this Joint Statement we report the outcome of our discussions in relation to each issue (below) by reference to points of agreement and disagreement relating to facts, assumptions, uncertainties, and expert opinions. We have noted where each of us is relying on the opinion or advice of other experts. Where we are not agreed in relation to any issue, we have set out the nature and basis of that disagreement.
8. Both John and David have carefully considered the position as recorded in the 2017 Joint Statement and their subsequent statements of evidence and have no change to the various points of agreement and disagreement as recorded in the 2017 Joint Statement. In particular, both participants confirm points 6a)-p) as recorded in the 2017 Joint Statement.
9. In confirming the position recorded in paragraph 8 above, both participants have considered new information and evidence not presented in 2017. In that respect, the participants have considered a series of statements and comment on each of those as follows:

- a) A 2014 list of seabird species likely to occur in the South Taranaki Basin (STB), prepared by Dr Paul Scofield, was not presented to the DMC in 2017. Dr Scofield's list contained species that were not included in the 2017 evidence.

Both participants agree with this statement.

- b) There are now six more years of data for occurrences of birds in the STB.

Both participants agree with this statement.

- c) Newly available results of kororā tracking studies show that, in addition to swimming very long distances from the Marlborough Sounds to the Pātea Shoals, kororā from Mana Island swim long distances to feed in the STB.

Both participants agree with this statement.

- d) The unique characteristics of the STB as a key area for seabirds are now recognised. The designation by the IUCN (International Union for Conservation of Nature) of the Cook Strait and Marlborough Sounds key biodiversity areas (KBAs; "the most important places in the world for species and their habitats") was not included in evidence presented to the DMC in 2017. These KBAs include all the waters of the STB, Cook Strait, and the inner waters of Marlborough Sounds.

Both participants agree with this statement.

- e) The extent of adverse effects on seabirds of climate change and likely declines of some seabirds associated with increased sea surface temperatures is now known to be much greater than was apparent in 2017.

Both participants agree with this statement.

SIGNATURES OF EXPERTS

