

Attachment 2 - Hector's and Māui dolphin Threat Management Plan – non-fishing threats. Final technical analysis of proposals

1. INTRODUCTION

The Hector's and Māui dolphin Threat Management Plan consultation document¹ outlined various proposals for addressing non-fishing threats. This paper provides a technical assessment of the proposals including comments on feedback received at public and commercial fisher meetings and through submissions on the consultation document on non-fishing threats.

Non-fishing threats are addressed individually in sections 5-10 of this report following the same general format; i.e.

- Background information².
- Proposals presented in the consultation document³.
- Economic/financial considerations.
- Submissions summary, including key themes and issues raised by submitters and during consultation meetings (note: submissions are summarised in a separate report⁴).
- Comment on key themes and issues.
- Conclusions.

Many of the proposals consulted on, as well as some proposals raised in submissions, in relation to extending the boundaries of marine mammal sanctuaries and controlling seismic surveying and seabed mining, require implementation through the marine mammal sanctuary provisions of the Marine Mammals Protection Act 1978 (MMP Act). The gazette notice process in section 22 of the MMP Act provides for further public input.

Aspects of submissions relating to the vision/goals/objectives and more widely about the risk assessment and scientific uncertainty are also being addressed separately by Fisheries New Zealand for the final advice paper. Hence, they are not covered in this paper.

2. NON-FISHERIES-RELATED THREATS – OVERVIEW

Hector's dolphin (estimated population of around 15,700 individuals) is ranked as nationally vulnerable in the New Zealand Threat Classification System. Māui dolphin (estimated population of around 63 individuals above one year of age) is ranked as nationally critical and is at serious risk of extinction.

The non-fisheries-related threats to Hector's and Māui dolphins addressed in the consultation document were:

- Toxoplasmosis;
- Seismic surveying;
- Seabed mining;
- Tourism;
- Other pressures including pollution and coastal development.

These threats are very context-specific with their risk for Hector's and Māui dolphins varying depending on a range of factors; for example, sub-species, location, likelihood, intensity, and

¹ Protecting Hector's and Māui Dolphins. Consultation on proposals for an updated Threat Management Plan. June 2019

² Taken directly or adapted from the consultation document *Protecting Hector's and Māui Dolphins* and the supporting report *Protecting Hector's and Māui Dolphins Supporting Information and Rationale*.

³ Also taken directly or adapted from the consultation document or the report *Protecting Hector's and Māui Dolphins Supporting Information and Rationale*.

⁴ Attachment 1 to Final Advice Paper: Summary of submissions received during public consultation

spatial and temporal scale. They can affect Hector's and Māui dolphins through various overlapping direct and indirect mechanisms including injury, disease, health effects, disturbance, noise, habitat modification, impacts on prey distribution and abundance, reduced foraging success, effects on reproduction, displacement, and habitat fragmentation. The wide range and overlapping nature of these threats and effects, coupled with impacts from fishing, means cumulative impacts are also highly relevant.

The range of threats and potential impacts means a broad management approach needs to be adopted to ensure subpopulations of Hector's and Māui dolphins recover and thrive, weighted towards those threats most likely to pose the greatest risk.

3. RISK ASSESSMENT

A spatial risk assessment⁵ was undertaken to support the TMP review and improve the information available for decision-making. Various submissions including from environmental organisations, industry and marine scientists raised significant concerns about the risk assessment and how it has been used to inform the TMP process. Fisheries New Zealand is leading advice for the final advice paper on the risk assessment including responding to issues raised through the submission and iwi engagement processes.

Briefly, the risk assessment enabled more refined estimates of spatial overlap of dolphin distribution with fishing activity and some non-fishing threats. It was able to provide better information for fishing-related risks to dolphins, but risks from industrial activities and noise pollution are less well understood. Assumptions and uncertainties within the risk assessment remain, particularly on effects from non-fishing activities, including disease, seismic exploration, seabed mining, pollution and coastal developments.

The risk assessment was able to provide some spatial information on threats from oil spills and noise disturbance, including seismic surveying and vessel traffic. Other activities, including seabed mining, vessel strike, tourism, coastal development, pollution, and climate change effects were limited to a review of the available literature to assess the potential threat to the dolphins.

As noted in Appendix 2 of the consultation document, the use of beach-cast dolphin carcasses to estimate rates of death relies on assumptions about the rate carcasses are recovered for necropsy and may be biased. Therefore:

- *Toxoplasmosis death estimates* are more uncertain and could be biased either high or low.
- *A possible sex bias in toxoplasmosis deaths* (if more females are dying) may have important implications; if the sex bias is real, then toxoplasmosis risk is higher than estimated.

In addition, non-lethal threats cannot be quantified:

- *Seismic risks* from underwater sound are estimates in a relative sense only, and only for Māui dolphins. While the level of sound the dolphins experience has been estimated quantitatively, it is unknown how this level of sound may affect dolphins, or how much sound is too much.

The limitations (assumptions, caveats and uncertainties) of the risk assessment are particularly relevant for non-fishing threats where the risk assessment was unable to quantify or map the risk. The risk assessment is a tool which helps inform but should not direct the outcomes of the TMP process.

⁵ Roberts, J.O.; Webber, D.N.; Roe, W.T.; Edwards, C.T.T.; Doonan, I.J. (2019). Spatial risk assessment of threats to Hector's/Māui dolphins (*Cephalorhynchus hectori*).

4. ECONOMIC INFORMATION

Economic information relevant to the specific proposals is provided in the subject matter sections. Economic information that cuts across all options is included in this current section, specifically:

- Information on the economic benefits of Hector's dolphins for tourism;
- A framework for assessing the total economic value of Hector's dolphins;
- Willingness to pay for dolphin protection (proxy for non-market values);
- Natural capital, wellbeing and decision making.

Economic benefits of Hector's dolphins for tourism

New information on the economic benefits of Hector's dolphin for tourism has become available since the TMP consultation document was written. Black Cat Cruises, Akaroa, commissioned an economic impact assessment (M.E Consulting 2018)⁶ on the value of Hector's dolphins. That study estimated the economic impacts of Hector's dolphin from eco-tourism⁷ at Banks Peninsula contributing \$24.5 million in value added to the national economy (of which \$19.5 million is in Canterbury) sustaining the equivalent of 476 jobs (of which 416 are in Canterbury). In addition, the estimated wider economic impacts from tourism spend in Christchurch related to Hector's dolphin is between another \$3 million to \$6 million per annum, equivalent to another 60 to 130 jobs to the economy.

Lee's (2019)⁸ peer review concluded this report as methodologically and analytically sound, follows best practice, and the economic findings can be applied with reasonable confidence. The review also noted the economic impacts of Hector's dolphin for New Zealand is underestimated because the study's scope was limited to the existing seven tour operators at Akaroa. Nationally, the economic impacts (benefits) of Hector's dolphin will be greater if the following are included: i) eco-tourism segments where Hector's dolphins are part of whale watching or eco-tours (e.g. the Marlborough Sounds); and ii) instances where Hector's dolphins are attracting tourists to places where there are no tour-operators (e.g. Curio and Porpoise Bays in the Catlins).

There is also potential for future growth in eco-tourism if further permits are considered acceptable under the Marine Mammals Protection Regulations 1992 (MMPR).

Framework for assessing total economic value of Hector's dolphins

Beyond market values, it is possible to consider Hector's dolphin as a natural resource and capital. Total Economic Value (TEV) is a commonly accepted framework for organising the various components of a natural resource or capital. For instance, TEV was used by the Ministry for Environment for water resource development in the Waitaki Catchment⁹ and was included in the Treasury's Living Standards Series Discussion Papers¹⁰.

Using TEV as a framework, the different use-values and non-use values (such as existence, bequest and option values) of Hector's dolphin can be identified. The report by M.E Consulting (2018) represents eco-tourism use values based on current market values but does not include non-market values. Lee (2019) agreed with M.E Consulting's (2018) conclusion that "*the total economic value of Hector's dolphin will include non-market values which are likely to be significant*" and noted non-market values are likely to be larger than the market values. In this context, non-market values consist of non-use values such as:

⁶ M.E Consulting, 2018. Hector's Dolphin Eco-Tourism: Economic Impact Assessment. Report prepared for Black Cat Cruises, 13 December 2018.

⁷ Tour operator and tourism spend

⁸ Lee, K. 2019. Review of "Hector's Dolphin Eco-Tourism: *Economic Impact Assessment*". Report prepared for the Marine Species and Threats Team, Department of Conservation, Wellington. 29 July 2019.

⁹ <https://www.mfe.govt.nz/publications/fresh-water-rma/option-and-existence-values-waitaki-catchment/3-total-economic-value>. Viewed August 2019.

¹⁰ In particular, Au, J. and van Zyl, S., 2018. The Start of a Conversation on the Value of New Zealand's Natural Capital (Living Standards Series Discussion Paper: DP 18/03), 22 February 2018.

- ecological function value (from services produced by Hector's dolphin that are critical to the functioning of the earth, including associated benefits from conservation and protection of its habitat);
- option value (from maintaining the right to benefit from Hector's dolphin as a resource in the future; i.e. as tourism demand and markets grow, and other potential benefits from scientific discoveries);
- bequest value (in terms of ensuring future generations will continue to benefit);
- existence value (from the satisfaction of simply knowing Hector's dolphins exist); and
- cultural value (e.g. as *taonga* to Maori and generally to all New Zealanders).

The report from the New Zealand Institute of Economic Review (NZIER, 2018)¹¹ to the Treasury on the use of non-use values concluded that "*the concepts of TEV and non-use value are important for estimating societal welfare*". According to them, the themes that emerged from their survey of approach and research in New Zealand showed the following strengths: i) "*New Zealand has an established capability to apply contemporary techniques to derive non-market values*"; and ii) "*the techniques have been applied to a wide range of environmental issues*".

Willingness to pay for dolphin protection (proxy for non-market values)

From a survey of 1000 people, Hoyt *et al* (2014)¹² reported that "*80% of respondents voiced strong support for further measures to protect NZ dolphins and many were willing to pay for their increased protection*". The authors estimated New Zealanders collectively were willing to pay \$355,000 per dolphin in the form a 'dolphin protection tax' to fund measures for Hector's and Māui dolphin protection. They noted these values are "*not unreasonable considering NZ dolphins are endemic to New Zealand waters, have low population numbers (especially the Maui's subspecies) and are well known by 70-80 percent of survey respondents*".

Hoyt *et al* (2014) estimated "*the 'welfare' loss to the people of New Zealand*" from fishing-related mortality of Hector's and Māui dolphin to be \$46 million¹³ annually. This cumulative figure represents the annual total sum that New Zealanders were willing to pay for protecting dolphins. Hence, this "welfare" value is a reflection of the aggregate of the various non-market values (ecological function, option, bequest, existence, and cultural).

Natural capital, wellbeing and decision making

Natural capital is one of the four capitals of the Treasury's Living Standards Framework (LSF) as indicators of intergenerational well-being. The others are: human capital; social capital; and financial and physical capital. The top three points from the Treasury's LSF Quick Guide to the Future¹⁴ relevant here are:

- "*Intergenerational wellbeing relies on the growth, distribution, and sustainability of the four capitals*";
- "*The capitals are interdependent and work together to support wellbeing*"; and
- "*We need to consider trade-offs between the capitals, and recognise how we might prioritise one over the other. This is especially important when thinking about Natural Capital ...*"

Indigenous biodiversity (and natural landscapes) contribute in a very wide variety of ways to the wellbeing of New Zealand and New Zealanders – in some ways they even represent the fundamental essence of what it means to be a New Zealander (Roberts *et al*, 2015)¹⁵. Roberts

¹¹ NZIER, 2018. What's the use of non-use values? Non-Use Values and the Investment Statement. Revised NZIER report to The Treasury, 1st February 2018.

¹² Hoyt, E., McGrath, G., Bossley, M., Knowles, T., 2014. Assessing New Zealanders' Willingness -to-pay to Protect the Endangered New Zealand Dolphin (*Cephalorhynchus hectori*): A benefit-cost analysis comparing three scenarios. Economists at Large, Melbourne, Australia and Critical Habitat Marine Protected Areas Programme, Whale and Dolphin Conservation, Chippenham, United Kingdom.

¹³ Based on their estimate of 130 dolphins killed in fishing nets (\$355,000 x 130 = \$46 million).

¹⁴ <https://treasury.govt.nz/publications/guide/living-standards-framework-quick-guide-our-future>. Viewed August 2019

¹⁵ Roberts, L., Brower, A., Kerr, G., Lambert, S., McWilliam, W., Moore, K., Quinn, J., Simmons, D., Thrush, S., Townsend, M., Blaschke, P., Costanza, R., Cullen, R., Hughey, K., Wratten, S. 2015. The nature of well being: how nature's ecosystem services contribute to the wellbeing of New Zealand and New Zealanders. Department of Conservation, Wellington. 145 p.

et al (2015) also noted the important role of: “helping all New Zealanders to recognise the relevance of functioning natural systems to them personally and to increase awareness that they also have a role to play in conserving them” including the “irreplaceable contribution of ecosystem services”; and realising “the full consequences to their wellbeing of environmental degradation and biodiversity decline until the situation has become irreversible, or at the least very costly and difficult to overturn”.

Based on a recent literature review on capturing natural capital in decision making, NZIER (2017)¹⁶ made the key point that “failing to value natural capital leads to sub-optimal decision-making”. Whilst natural capital approaches enable us to recognise “some value for natural resources that are commonly regarded as value-less in economic terms”, ignoring or underestimating such values means decision on natural resources will be prone to over-exploitation and “externality effects on current and future generations”.

5. TOXOPLASMOSIS

5.1. Background information

Toxoplasmosis is a parasitic disease caused by infection with *Toxoplasma gondii* oocysts. Cats are the only “definitive host” animal (i.e. in which the parasite can reproduce). The oocysts (eggs) are spread into the environment via cat faeces and can survive for many months. Rainwater and runoff transport the oocysts into the coastal environment through streams, rivers and storm-water drains. As they are ingested by other animals, they may accumulate up the food chain, ultimately infecting Hector’s and Māui dolphins that have ingested contaminated prey or water. It only takes one oocyst to infect a dolphin, and the risk of infection increases where there are high levels of water runoff from land and high cat densities.

Carcasses of dead dolphins are examined for cause of death when in suitable condition. Of the deaths that were not fishing related, toxoplasmosis was identified as the cause in 29% of the non-calf dolphins examined (nine of 31 dolphins; seven of these were mature females). Two toxoplasmosis-related deaths were from carcasses reported on the west coast of the North Island (Māui dolphin habitat), five on the east coast of the South Island and two on the west coast of the South Island.

Table 1: Confirmed deaths of Hector’s and Māui dolphin from toxoplasmosis (as determined by necropsy).

Date	Sub-species	Location	Physical population	Sex	Age class
10/11/2007	Māui dolphin	Waikato	WCNI	Female	Adult
2/10/2008	Hector’s dolphin	West Coast	WCSI	Male	Juvenile
7/11/2008	Hector’s dolphin	West Coast	WCSI	Female	Adult
30/10/2009	Hector’s dolphin	Canterbury	ECSI	Female	Adult
3/10/2010	Hector’s dolphin	Canterbury	ECSI	Female	Adult
20/11/2010	Māui dolphin	Waikato	WCNI	Male	Juvenile
17/10/2011	Hector’s dolphin	Otago	ECSI	Female	Adult
11/09/2015	Hector’s dolphin	Otago	ECSI	Female	Adult
21/10/2017	Hector’s dolphin	Otago	ECSI	Female	Adult

Note: Comprehensive testing for toxoplasmosis was not undertaken until 2011; animals that died prior to 2011 were only definitively confirmed to have died from toxoplasmosis following new tests carried out after 2011 on archived samples. Data source: Hector’s and Māui dolphin incident database; <https://www.doc.govt.nz/our-work/hectors-and-maui-dolphin-incident-database/>

The risk assessment indicates toxoplasmosis is a significant human-caused threat to Māui and Hector’s dolphins, but certain locations are of particular concern. The risk assessment estimates toxoplasmosis exposure in different locations by estimating cat densities as a function of human density and using a hydrological model to estimate the transport of oocysts to the sea via terrestrial runoff. A similar approach has been shown to accurately estimate

¹⁶ NZIER, 2017. Natural Capital in Decision Making; Report to the Treasury and Natural Resource Sector Agencies, September 2017.

toxoplasmosis exposure in Californian sea otters. Coastal areas adjacent to large river mouths (such as the Waikato River) and close to high-density cat areas (such as cities and large towns) are likely to be specific hot spots of high exposure to toxoplasmosis.

The estimates of mortality associated with toxoplasmosis rely on assumptions around the relative detectability of carcasses dying from different causes of death and reporting of dead dolphins by the public for subsequent necropsy. The number of necropsied carcasses is not high; as a result, there is substantial uncertainty around the estimated number of toxoplasmosis-related deaths, and these estimates may be biased either high or low. However, even though the estimates are highly uncertain, the risk to the dolphins is significant even at the lower bound of these estimates, and the potential threat of this disease must be taken seriously, especially for Māui dolphins which experience the highest estimated exposure levels.

The risk assessment suggests that Māui dolphins are the population most exposed to toxoplasmosis risk; it is estimated toxoplasmosis is responsible for roughly two (probably ranging between 0.5 and 3.3) Māui dolphin deaths per year. Even at the lower end of this range, the risk assessment indicates that toxoplasmosis may kill more dolphins than any other human threat. Māui dolphin population demographic models produced independently from the risk assessment estimate that toxoplasmosis risk is sufficient to drive ongoing population decline even in the absence of any other human threat.

Hector's dolphins are also exposed to toxoplasmosis risk. At the scale of the whole South Island, the risk assessment estimates roughly 300 (probably ranging between 50 and 700) Hector's dolphin deaths per year, but the risk is not uniform across the four populations and is subject to the same uncertainty described above. Modelling in the risk assessment indicated the Hector's dolphin population likely to be most exposed to toxoplasmosis risk are on the west coast South Island, but this estimate is driven largely by the amount of rainfall, and further research is required to better understand spatial differences in toxoplasmosis exposure.

The threat from toxoplasmosis also impacts on agriculture and human health, and may have implications for other native wildlife.

Mitigating the threat of toxoplasmosis to Hector's and Māui dolphins covers terrestrial, freshwater and marine domains, as well as agriculture and human health. As such, it will require a multidisciplinary and collaborative approach, working with a range of agencies and organisations. DOC can build upon existing knowledge and align with existing work programmes (such as Essential Freshwater, the Three Waters Review and Predator Free 2050) to reduce the threat of toxoplasmosis. However, these work programmes are not specifically aimed at reducing dolphin deaths from toxoplasmosis, and there is no one action that can immediately be undertaken to eliminate toxoplasmosis in the dolphins' habitat.

5.2. Proposals in the consultation document

Acknowledging the urgency for Māui dolphin in particular, DOC proposed the development of a Toxoplasmosis Action Plan with the following objectives:

- Reduce the number of dolphin deaths attributable to toxoplasmosis (determined through examination of carcasses) to near zero.
- Improve knowledge on toxoplasmosis to increase ability to take actions to reduce this threat.

While the first objective is aspirational and likely to be long-term, it recognises the importance of tackling the threat particularly for the critically endangered Māui dolphin.

The Toxoplasmosis Action Plan was proposed to include a range of workstreams, focused on targeted research, direct actions, improving awareness, and understanding the overall impacts of toxoplasmosis on New Zealand's native wildlife.

Informed by feedback from submissions, the final Toxoplasmosis Action Plan would be developed as part of the TMP. DOC also proposed to co-ordinate a workshop focused on toxoplasmosis, involving national and international experts, to refine and prioritise research identified in the Toxoplasmosis Action Plan, within six months of the TMP being updated. DOC would co-ordinate implementation of the Toxoplasmosis Action Plan across central and local government.

Under the overarching vision, goal and objectives of the TMP, DOC and Fisheries New Zealand proposed threat-specific objectives, whereby agencies can measure progress against mitigating or eliminating the threats. These objectives also act as decision trigger points at which time an additional action might be taken. Given the large amount of uncertainty that remains around the impact of toxoplasmosis on the dolphins, it is difficult to develop specific performance measures that are meaningful. Instead, performance plans were proposed to measure progress towards achieving the two objectives.

Proposed performance plan: Reduce the number of dolphin deaths attributable to toxoplasmosis to near zero.

The monitoring of success related to this goal is dependent on examination of beach-cast carcasses. Acknowledging this is a long-term objective, DOC recommended the following for monitoring progress and identifying points where a change in approach might be made.

1. Given the highest risk of toxoplasmosis is on the west coast of the North Island in Māui dolphin habitat, implementation of the action plan will be prioritised here in the first instance and expanded to other areas as possible.
2. Causes of death to Māui and Hector's dolphins will continue to be monitored through DOC's necropsy contract with Massey University. All dolphin carcasses will be tested for toxoplasmosis, even if it wasn't the primary cause of death.
3. Should there be more than two deaths a year from toxoplasmosis on either the east or west coast of the South Island, we would evaluate what actions could be taken or re-prioritised for that area.
4. Should there be two or more deaths of a Māui dolphins, or five or more of Hector's dolphins, in a year from toxoplasmosis, then a re-evaluation of the whole action plan would be initiated.

Proposed performance plan: Improve knowledge on toxoplasmosis to increase ability to take actions to reduce this threat.

The consultation document proposed the Toxoplasmosis Action Plan identify and implement research to fill critical gaps and support the identification and prioritisation of effective action. Research results were proposed to be reported through existing science working groups, with opportunities for engagement by tangata whenua and stakeholders. As new information comes to light from any of the workstreams, actions would be adapted or re-prioritised.

It was proposed the action plan be evaluated against the above two objectives within five years of the TMP being updated.

Draft Toxoplasmosis Action Plan

A draft Toxoplasmosis Action Plan¹⁷ has been developed based on the proposal included in the consultation document and informed by feedback from submissions. The draft plan is summarised below.

Overall objective: *Reduce toxoplasma loading to the marine environment so that the number of dolphin deaths attributable to toxoplasmosis is near zero.*

¹⁷ The draft Toxoplasmosis Action Plan will be provided with the Final Advice Paper.

Given the robust nature of toxoplasma oocysts and the widespread distribution of cats in New Zealand the overall objective is aspirational and unlikely to be achievable in the short-term, but it recognises the importance of tackling the threat particularly for the critically endangered Māui dolphin.

There are many potential management actions that could reduce toxoplasma loading to the marine environment; actions could focus on reducing the oocyst loading from cats (e.g., by reducing the number of cats through feral cat control or stray cat management), or could focus on reducing the flux of oocysts to the marine environment (e.g. by trapping oocysts in wetlands, or stormwater or wastewater treatment). However, there are major knowledge gaps in terms of the efficacy and costs of these potential management actions, and so there is a critical need for research to inform these.

For example, there is a need to identify the source of oocysts in the marine environment, and then prioritise actions appropriately. This requires an improved understanding of the toxoplasma genotype responsible for dolphin deaths, and identification of “hotspots” of toxoplasma contamination in marine and freshwater environments at a scale that is useful to inform management.

There is also a need to determine the costs and benefits of each potential management actions, based on the spatial and temporal scale of action required to effectively reduce toxoplasma loading, and the resources and evidence base required for implementation under relevant legislation. Barriers to effective implementation within current legislative frameworks may also need to be identified, and solutions developed to address these.

Given the uncertainty around the estimated number of toxoplasmosis-related deaths in Hector’s and Māui dolphins, and the wider effects of toxoplasmosis on New Zealand biodiversity in general, the draft plan also contains two research objectives: 1) reduce uncertainty in estimates of Hector’s and Māui dolphin deaths from toxoplasmosis; and 2) improve understanding of the effects of toxoplasmosis on Hector’s and Māui dolphin and other New Zealand native species. This would include research to increase understanding of other factors (e.g., contamination with other pollutants, other diseases, genetics, pregnancy, prey availability) that might increase susceptibility in the dolphins to infection, morbidity or mortality associated with toxoplasmosis.

The draft plan recognises it is also important to improve awareness about toxoplasmosis in general (and effects on dolphins in particular) among the general public, and within agencies that have responsibility for cat management. Campaigns should focus on cat owner behaviour change and the effects of toxoplasmosis on dolphins and other wildlife.

The Department of Conservation will lead and co-ordinate implementation of the plan across central and local government. This will involve establishing governance, advisory and delivery structures, as well as ongoing coordination of the work programme. Toxoplasmosis covers diverse areas of interest, expertise and mandate, so there is a need to involve tangata whenua and a wide array of stakeholders in governance and/or advisory groups. Stakeholders include other government agencies (e.g. local government, Ministry for Primary Industries, Ministry for the Environment, Ministry of Health), and other organisations such as the SPCA, National Cat Management Strategy Group and eNGOs.


In collaboration with MPI, a Toxoplasmosis Management Strategic Science Advisory Group (SSAG), similar to those established for myrtle rust and kauri die back, should be established. Using the draft plan as a starting point the SSAG will need to identify and prioritise immediate research needs and develop a science plan. DOC and the SSAG will hold a science workshop focused on toxoplasmosis (and in particular with regards to effects on marine mammals), involving relevant national and international experts, to refine and prioritise potential research themes.

To measure progress against the overall objective in this plan, causes of death to Hector's and Māui dolphins will continue to be monitored through DOC's necropsy contract with Massey University. All dolphin carcasses will be tested for *Toxoplasma* infection even if it wasn't considered a contributing factor in mortality.

Research results may be reported through updates on websites, newsletters, symposia and science working groups, with opportunities for engagement by tangata whenua and stakeholders. Progress on research and action, and towards achieving the overall objective of this plan, will be communicated to stakeholders on an annual basis, and will be comprehensively evaluated within five years of the TMP being updated.

5.3. Economic/financial considerations

9(2)(f)(iv)



5.4. Submissions

Specific criticism outlined in submissions (and during feedback at meetings) about the proposed response to toxoplasmosis included broadly:

- Not acting soon enough.
- Overstating the risk.
- Understating the risk.
- Making fishing and other industries the scapegoat for what is seen as mostly a toxoplasmosis issue.
- Criticism of the risk assessment particularly in relation to the relative risk of toxoplasmosis versus fishing impacts.
- Criticism of the proposed performance plan included in the consultation document, especially in relation to re-evaluation of the action plan occurring should there be a certain number of dolphin deaths from toxoplasmosis (given only a small proportion of dead dolphins may be beachcast and then recovered for necropsy).
- A lack of detail in the consultation document about the Toxoplasmosis Action Plan, including commitment to funding.
- Concern that attention on (and funding for) toxoplasmosis would somehow reduce attention and funding for addressing the fisheries threat.
- Concern that attention on toxoplasmosis would detract from other sources of pollution (including organic contaminants and sediment) that might be impacting on the dolphins.

The submission from Te Runanga O Ngai Tahu noted the importance of a 'ki uta ki tai' management approach (that considers the connections from land to sea) with the suggestion that the Toxoplasmosis Action Plan could be an opportunity to use these principles. It supported more research but noted funding needs to be weighed against other protection measures. The Iwi Collective Partnership and Te Ohu Kaimoana submitted toxoplasmosis is the dominant threat to Hector's and Māui dolphins and that further fishing restrictions are unjustifiable. Te Runanga o Ngati Ruanui Trust recommended inclusion of the disease brucellosis (and associated research) in the Toxoplasmosis Action Plan. Te Kotahitanga o Te Atiawa supported the Te Ohu Kaimoana submission and its emphasis on toxoplasmosis. Ngati Te Wehi submitted toxoplasmosis is a questionable threat compared to fishing.

Many submissions agreed toxoplasmosis is a significant threat to the dolphins and supported the development of a Toxoplasmosis Action Plan to address this threat. There was strong support (from e.g., NZ Veterinary Association, regional sector Biosecurity Special Interest Group) for addressing the toxoplasmosis risk to dolphins via wider cat management initiatives. This included consideration of comprehensive unowned (feral and stray) cat management, legislative change to enforce responsible cat ownership, and ways to improve understanding

of, and to build upon, social license to operate in this space. Submissions highlighted the need for collaboration with a wide variety of stakeholders and consideration of animal welfare in any cat management initiatives. There was also support for research to improve understanding on the effects of toxoplasmosis on native species other than Hector's and Māui dolphins.

There was support for a multi-agency/organisation approach to tackle this issue, and regional sector feedback that national leadership (including adequate funding) is essential. The regional sector also requested early and on-going engagement and collaboration on toxoplasmosis research and management actions, a public engagement strategy, and an additional engagement objective relating to a desired level of behaviour change among cat owners. The 'Option 5' joint submission from WWF, Sanford and Moana NZ proposed an agency be established to conduct communications and research about toxoplasmosis.

Several submissions suggested that in addition to (or instead of) toxoplasmosis the effects of other infectious diseases and sources of pollution on dolphin mortality, health (especially in relation to immunosuppression) and habitat should be further researched. This included diseases such as brucellosis, and other pollutants such as organic contaminants, PCBs, and endocrine disruptors. Climate change and prey availability were also raised as threats (that could be as significant, or more significant, than toxoplasmosis) and should be further researched and considered under the TMP.

Submissions from some eNGOs, scientists and individuals were critical of the risk assessment for overstating the significance of toxoplasmosis compared to fishing. Many of these submitted that fishing remains the most significant threat to Māui and Hector's dolphins and further stressed the need to act on the fishing threat as that would be "simple" to manage, relative to managing toxoplasmosis.

In contrast, submissions from other eNGOs, scientists and individuals supported the development of a Toxoplasmosis Action Plan, and research to inform action, often emphasising that this reflected the need to better understand and address all threats to the dolphins.

Many submissions from commercial and recreational fishers believed the risk assessment clearly showed toxoplasmosis was the dominant threat and the proposed fisheries restrictions were therefore unjustified. Similarly, submissions from industries involved in seismic surveying and seabed mining believed those threats to be insignificant compared to toxoplasmosis.

5.5. Comment

Fisheries New Zealand is leading the response to specific criticism about the risk assessment.

Māui dolphins are most at risk from toxoplasmosis. Toxoplasmosis is estimated to cause between 0.5 and 3.3 Māui dolphin deaths per year and is sufficient to drive ongoing population decline even without other human threats. Toxoplasmosis is estimated to cause roughly 300 (probably ranging between 50 and 700) Hector's dolphin deaths per year, but the risk is not uniform across the four populations. Hector's dolphins should be more resilient to toxoplasmosis due to their much bigger populations.

However, these estimates of toxoplasmosis mortality are very uncertain. As acknowledged above, the estimates have various assumptions, caveats and possible biases. Notwithstanding these uncertainties, the risk of toxoplasmosis is significant even at the lower bounds of the estimates. Particularly for Māui dolphins where the population is so small and at serious risk of extinction, both toxoplasmosis and fishing are considered significant threats and need to be addressed through the TMP.

While the consultation document included high level commentary about the proposed Toxoplasmosis Action Plan, finer details were not provided. A draft Toxoplasmosis Action Plan has now been prepared which includes more detail, proposed areas for action and research

needs, and a pathway for implementation, including indicative costings. This document remains a working draft because it is expected to be further developed via the Toxoplasmosis Management Strategic Science Advisory Group, and to evolve over time as new information comes to hand and there is further input from iwi/hapū, scientists, other agencies and stakeholders.

There was criticism about the Toxoplasmosis Action Plan having no clearly stated solution (e.g., a cat eradication programme). While having a clear solution now would be ideal, it is unrealistic. The issues are highly complex and there is no obvious “silver bullet”. The Toxoplasmosis Action Plan is a pathway towards addressing the risk of toxoplasmosis to Hector’s and Māui dolphins.

There was a view DOC should have acted sooner on the toxoplasmosis risk. While the first recorded Māui (or Hector’s) dolphin to have died from toxoplasmosis was in 2007, toxoplasmosis was not definitively confirmed as the cause of death until 2011, when new testing methods were used on archived samples (Table 1). At the time, it was not known if this record was a single anomalous one or a sign of a much bigger problem. Toxoplasmosis was not systematically checked for in necropsies (or archived samples) prior to 2007 so it is possible it may have been an issue for much longer. Subsequent necropsies checked for toxoplasmosis and the significance of the disease was not fully recognised until several other Māui (one further mortality) and Hector’s dolphins were also confirmed to have died of the disease (Table 1). No Māui dolphin mortalities from toxoplasmosis have been confirmed since 2010. The 2018 risk assessment was the first attempt to scientifically estimate the risk from this disease for both sub-species at the population level, and in the context of other risks.

In addition, and as noted earlier, toxoplasmosis is a very widespread, complex and difficult threat to manage. There is much we still do not know including: risks from unowned (feral and stray) versus owned cats; pathways and hotspots of toxoplasmosis contamination in catchments and the marine environment; and management actions for combatting the threat. A “knee-jerk” response to toxoplasmosis could have resulted in significant costs with little effect.

There will not be one solution to reducing toxoplasmosis impacts on dolphins. Greater benefits will be realised by focusing management actions at points in the toxoplasmosis pathway (for example, at the cat) that will also benefit other species in addition to the dolphins. Wetland restoration or riparian plantings may also reduce risks from toxoplasmosis. Where prioritisation of workstreams is required to meet financial demands, it is proposed actions with a direct influence on Māui dolphin habitat take precedence.

Toxoplasmosis is a widespread issue geographically, biologically (intra and inter-species) and administratively, with implications for several agencies across both central and local government. It will require a multi-agency and multidisciplinary approach, with prioritisation towards those aspects and places where there is the greatest risk and the greatest likelihood of success. Planning and financial management will be complex but with good opportunities for collaboration, efficiencies and cost sharing.

The draft action plan includes indicative costs. However, given the complexities outlined above, including the need to engage and work with multiple agencies, exact costings are not yet available.

5.6. Conclusions

Toxoplasmosis is a significant threat to Māui and Hector’s dolphins and needs an urgent and coordinated response. The development and implementation of the Toxoplasmosis Action Plan is considered essential to achieving the goals of the TMP.

6. MARINE MAMMAL SANCTUARY EXTENSIONS

6.1. Background Information

New Zealand has eight sanctuaries for protecting marine mammals – six marine mammal sanctuaries established under the MMP Act and two sanctuaries created under the Kaikōura (Te Tai o Marokura) Marine Management Act 2014 (Figure 1).

Five of the marine mammal sanctuaries (West Coast North Island, Clifford and Cloudy Bay, Banks Peninsula, Catlins Coast, and Te Waewae Bay) are relevant for the management of Hector's and Māui dolphins. Options to amend restrictions in these five marine mammal sanctuaries are discussed in sections 7 and 8 of this paper.

The consultation document proposed area extensions to The West Coast North Island Marine Mammal Sanctuary and the Banks Peninsula Marine Mammal Sanctuary.

The West Coast North Island Marine Mammal Sanctuary was established in 2008 as a part of the TMP. It extends from Maunganui Bluff in Northland to Oakura Beach, Taranaki, in the south, and offshore to the 12-nautical mile limit (Figure 2).

There are restrictions on acoustic seismic surveying throughout the West Coast North Island Marine Mammal Sanctuary (see Section 7). Seabed mining is prohibited out to two nautical miles along the full length of the sanctuary, and out to four nautical miles from south of Raglan Harbour to north of Manukau Harbour (Figure 2). Commercial and recreational set-net fishing is prohibited in a portion of the sanctuary between two and seven nautical miles offshore between Pariokariwa Point and the Waiwhakaiho River; this set-netting restriction is in addition to other fishing restrictions implemented along this coast under the Fisheries Act.

Māui dolphins are found only on the North Island's west coast (Figure 3) and have a very small population size. While there is no evidence of a resident population south of Cape Egmont, public sightings and acoustic detections confirm Hector's and/or Māui dolphins are infrequently present there, and historical evidence suggests they were likely to have been more abundant in this area in the past. The risk assessment identified this southern area as a potential transitional area between Hector's and Māui dolphins and an area of suitable habitat for the dolphins. Therefore, risk reduction in this southern area may reduce barriers to population connectivity or facilitate re-colonisation of previously occupied areas.

The current Banks Peninsula Marine Mammal Sanctuary extends from the mouth of the Rakaia River to the mouth of the Waipara River and to 12 nautical miles offshore (Figure 4). There are restrictions on acoustic seismic surveying throughout the Banks Peninsula sanctuary.

The risk assessment process identified Hector's dolphin distribution off the east coast of the South Island ranging well beyond the current boundaries of the Banks Peninsula Marine Mammal Sanctuary, with particularly high densities outside current protected areas north of Banks Peninsula and south toward Timaru (Figure 5).

6.2. Proposals in the consultation document

The consultation document proposed to extend the boundaries of the West Coast North Island Marine Mammal Sanctuary southwards to Wellington as depicted in Figure 2, with the restrictions proposed for seismic surveying and seabed mining (see Sections 7 and 8 respectively for details) also applying in the extended area. The proposed southern boundary is at the western boundary of Taputeranga Marine Reserve and abuts the Clifford and Cloudy Bay Marine Mammal Sanctuary.

The consultation document also proposed to extend the Banks Peninsula Marine Mammal Sanctuary north to the southern boundary of the Te Rohe o Te Whānau Puha / Kaikōura Whale Sanctuary, south to Timaru, and offshore to 20 nautical miles throughout (Figure 4). These extensions would allow for protection of Hector's dolphins across a greater portion of their distribution as identified by the spatial risk assessment (Figure 5). Proposed restrictions on seismic surveying and seabed mining within the sanctuary are outlined in Sections 7 and 8 of this paper, respectively.

These proposed sanctuary extensions would align with some of the fisheries proposals presented in the consultation document.

6.3. Economic/financial considerations

Economic effects of the proposed sanctuary extensions on seismic surveying and seabed mining, including existing users, will depend on what restrictions are implemented and where. These matters are addressed in sections 7 and 8 which discuss the restrictions.

6.4. Submissions

Submissions on the proposed marine mammal sanctuary extensions were broadly grouped into:

- Those agreeing with the proposed extensions to the two marine mammal sanctuaries. Greatest attention was given to the West Coast North Island Marine Mammal Sanctuary.
- Those seeking greater protection across the full range of Hector's and Māui dolphins including the implementation of larger marine mammal sanctuaries or new ones, including:
 - out to the 100-metre depth contour;
 - out to 20 nautical miles;
 - across Cook Strait to link to the top of the South Island;
 - around the entire South Island;
 - buffer zones around the sanctuaries;
 - creating a marine reserve instead.
- Submissions from industry (petroleum, seabed mining and fishing) generally asserting the marine mammal sanctuary extensions are unjustified and unnecessary. In particular, the southern extension of the West Coast North Island Marine Mammal Sanctuary was challenged by submissions from the petroleum and seabed mining industries.

The option of fishing restrictions being implemented within the marine mammal sanctuaries, independently from the Fisheries Act, was also raised.

Te Rūnanga o Ngāti Ruanui Trust submitted the scope of the West Coast North Island Marine Mammal Sanctuary should be extended to include all taonga species (including other marine mammals, migratory freshwater fish and seabirds) and their habitat. The trust's submission also noted the West Coast North Island Marine Mammal Sanctuary extension and Taranaki marine mammal sanctuary proposal should be integrated, rather than done piecemeal, and that discussions relating to the marine mammal sanctuary be undertaken separately from the TMP.

Te Runanga o Ngai Tahu submitted that any extension of the Banks Peninsula Marine Mammal Sanctuary requires engagement between DOC and local rūnanga and must not impact on rights and interests of Ngai Tahu. The submission from Nga Hapu o Te uru o Tainui sought management in marine mammal sanctuaries be delegated to local Mataitai Committees.

6.5. Comment

There was considerable overlap between submissions on this section of the consultation document and the sections dealing with the restrictions (i.e. seismic surveying and seabed mining) within the sanctuaries; see sections 7 and 8.

Submissions on the size and extent of the marine mammal sanctuaries were highly variable, from those promoting the status quo through to those seeking bigger increases in area, or some wanting totally new sanctuaries.

As noted above, the effect of the proposed sanctuary extensions will depend on what restrictions are implemented and where. The consultation document included various proposals for restricting seismic surveying and seabed mining and advice on these matters, including within the proposed area extensions, is provided in sections 7 and 8 of this paper. It is not possible to separate discussions about the sanctuary extensions from the proposed restrictions within them.

In relation to Te Rūnanga o Ngāti Ruanui Trust's submission to integrate the West Coast North Island Marine Mammal Sanctuary extension and the Taranaki marine mammal sanctuary proposal, integration at this stage would delay protection to Māui dolphins. It will be important, however, to ensure decisions on the Taranaki marine mammal sanctuary take into account the TMP.

Southward extension of the West Coast North Island Marine Mammal Sanctuary

The area from Cape Egmont south to Wellington is not part of the core habitat of Māui dolphin. While there is no evidence of a resident population south of Cape Egmont, public sightings and acoustic detections confirm Hector's and/or Māui dolphins are infrequently present there, and historical evidence suggests they were likely to have been more abundant in this area in the past.

The risk assessment identified this southern area as a potential transitional area between Hector's and Māui dolphins and an area of suitable habitat for the dolphins. Therefore, risk reduction in this southern area may reduce barriers to population connectivity (across the entire area) and facilitate re-colonisation of previously occupied areas (greatest potential in the north for Māui dolphin and across the entire area for Hector's dolphin).

Proposed protection measures in this southern zone (seismic surveying and seabed mining restrictions; see sections 6 and 7) will provide less direct benefit to Māui dolphins than proposals to the north of Cape Egmont which is where the great majority of the dolphins currently occur. They may aid population connectivity in the short to medium term and facilitate re-colonisation of previously occupied areas in the longer term. Potential benefits will generally increase with the size of the area but will also be area and sub-species specific.

It is not possible to quantify these benefits in absolute terms or relative to other proposed protection measures, nor put any firm timeframes on them (they are likely to span decades or longer).

Additional extensions to the West Coast North Island Marine Mammal Sanctuary sought in submissions (offshore and southwards)

Although it is plausible for Hector's dolphins (and presumably Māui dolphins) to venture beyond the 12-mile limit, especially where the 100-metre depth contour is further offshore, such occurrences are likely to be relatively uncommon considering the dolphins' more coastal habits. The habitat modelling predicts Māui dolphins to be mostly inshore.

The proposed measures relate to seismic surveying and seabed mining (sections 6 and 7) and neither of these activities pose a significant lethal threat. Extending the West Coast North Island Marine Mammal Sanctuary beyond the territorial sea is not considered necessary to manage the potential threats posed by seismic surveying or seabed mining.

Linking the West Coast North Island Marine Mammal Sanctuary to the top of the South Island would be in keeping with the proposed transition zone linking the South and North Islands.

Banks Peninsula Marine Mammal Sanctuary

As noted above, *"the risk assessment process identified Hector's dolphin distribution off the east coast of the South Island ranging well beyond the current boundaries of the Banks Peninsula Marine Mammal Sanctuary, with particularly high densities outside current protected areas north of Banks Peninsula and south toward Timaru."* The proposed extensions *"would*

allow for protection of Hector's dolphins across a greater portion of their distribution as identified by the spatial risk assessment.” Advice on this matter remains unchanged.

The proposed extension would not include all the continental shelf out to 100 metres depth. While changing the offshore boundary to better match the 100-metre depth contour may have some advantages, the benefits are probably small considering the distances offshore, the low likelihood of seismic surveying and seabed mining occurring there, and because neither of these activities pose a significant lethal threat.

Marine Mammal Sanctuaries around the entire South Island and along the east coast of the North Island

The consultation document proposed extensions to the West Coast North Island Marine Mammal Sanctuary and the Banks Peninsula Marine Mammal Sanctuary given the priority for protecting Māui dolphin and the significance of the Canterbury coast as Hector's dolphin habitat. The risk assessment and spatial habitat modelling did not identify sufficient risk to support marine mammal sanctuaries elsewhere. Advice on this matter remains unchanged.

Inclusion of other species

The merits of taking a more holistic view for marine protection are acknowledged. However, the current Māui and Hector's dolphins TMP process is species-centric and other marine species were not considered in the consultation document. Non-marine mammal species cannot be considered within a marine mammal sanctuary under the MMP Act. Nevertheless, protection measures for Māui and Hector's dolphins could indirectly benefit other taonga species.

The proposal to create a marine reserve to replace the West Coast North Island Marine Mammal Sanctuary would involve a totally different statutory process and is considered out of scope of the current process.

Fishing restrictions within marine mammal sanctuaries

As agreed by Cabinet, the consultation document proposed all fisheries-related matters be addressed under the Fisheries Act, the principle legislative tool for managing fishing. This approach simplifies management and avoids possible duplication and conflicts between different pieces of legislation.

Nevertheless, it is possible to restrict fishing within marine mammal sanctuaries through section 22 MMP Act (e.g. the 2013 amendment to the West Coast North Island Marine Mammal Sanctuary restricted set netting in north Taranaki).

6.6. Conclusions

The proposed extensions to the Banks Peninsula Marine Mammal Sanctuary align with the known distribution (sightings and modelled habitat) of Hector's dolphins along the east coast of the South Island.

The benefits of the proposed southern extension to the West Coast North Island Marine Mammal Sanctuary (population connectivity and potential recolonization of suitable habitat, combined with the proposed measures outlined in sections 7 and 8) are less certain and are likely to take decades or longer before they are evident. The benefits are potential and cannot be quantified. Within the sanctuary extension proposal, a reduced area (offshore and/or along-shore) could be considered.

Decisions on the proposed sanctuary extensions also depend on what restrictions are imposed in the marine mammal sanctuaries (seismic surveying and seabed mining). These matters are addressed in detail in sections 7 and 8.

7. SEISMIC SURVEYING IN MARINE MAMMAL SANCTUARIES

7.1. Background Information

Marine seismic surveying consists of using an acoustic source (usually an array of air guns) to send a controlled sound wave beneath the surface of the seabed. Reflections of the sound wave are picked up by sensors as the wave bounces off subsurface formations, generating an image of subsurface geological structures.

The proposals in the consultation document focused on seismic surveys at sound levels typically used by the oil, gas and mining industry to assess the prospectivity of petroleum and mineral deposits. Seismic surveying of similar or lesser intensity can also be used for scientific research (for example, on fault lines to study earthquakes). Surveys may range in duration from a few days to many months.

Noise produced by seismic surveying is loud enough to pose risks to marine life. Marine mammals are particularly sensitive to effects from noise because they use sound to communicate, navigate, and find food. There is a substantial body of literature demonstrating that exposure to such noise may disturb important marine mammal behaviours, including breeding, feeding, and resting. Indirect effects may also result from changes in the distribution and abundance of their prey.

Effects on an animal will be influenced by a range of factors including the type and intensity of sound, what the animal is doing when it hears the sound, and whether the animal has been exposed to similar noises previously. Noise-induced effects range from mere perception, to acoustic masking and stress, through to behavioural and physiological or physical effects.

As part of the TMP review, DOC commissioned a review of the existing literature to assess potential impacts of petroleum and mineral exploration and production on the dolphins¹⁸. The literature review noted that, apart from theoretical or modelled assessments, no studies have been undertaken to assess the effects of seismic surveying on Hector's or Māui dolphins. Thus, there is no direct experimental or similar evidence that shows seismic surveying adversely affects Hector's or Māui dolphins. Such experimental research would require substantial funding and would necessitate intentional exposure of the dolphins to loud noise. The small number of Māui dolphins would also significantly hamper the ability to undertake such research.

Establishing (or disproving) a direct link between seismic surveying and population-level effects for Hector's or Māui dolphins is also hampered by the difficulty of undertaking research on long-lived, slowly reproducing animals, as such effects might take decades or more to be seen. These animals are also exposed to a variety of human activities and environmental variables over the course of their lives, which would make it difficult to attribute effects to a single activity.

Notwithstanding these limitations, other information about the biology and predicted hearing sensitivities of the species and the effects of seismic surveying on other cetaceans means we can be confident seismic surveying poses a threat to the dolphins. The literature review concluded that behavioural reactions were the most likely effect of noise-producing activities, such as seismic surveying, but there was no specific information available on behavioural responses of Hector's and Māui dolphins to noise. The authors concluded that the optimal techniques to reduce impacts on the dolphins would be a combination of noise-producing activities avoiding biologically important areas combined with strict restriction of any activities still permitted to occur.

Seismic surveying and the effects of seismic surveying on marine biodiversity is currently managed through several regulatory and non-regulatory processes:

- Crown Minerals Act 1991 (CMA) for the allocation of rights to extract Crown-owned minerals;

¹⁸ Lucke, K., D. Clement, V. Todd, L. Williamson, O. Johnston, L. Floerl, S. Cox, I. Todd, and C.R. McPherson. 2019. *Potential Impacts of Petroleum and Mineral Exploration and Production on Hector's and Māui Dolphins*. Document 01725, Version 1.0. Technical report by JASCO Applied Sciences, Cawthron Institute, and Ocean Science Consulting Ltd. for the Department of Conservation, New Zealand.

- the Exclusive Economic Zone and Continental Shelf (Environmental Effects Act 2012 (EEZ Act)) and the Exclusive Economic and Continental Shelf (Environmental Effects—Permitted Activities) Regulations 2013 (the permitted activity regulations) for managing the effects of seismic surveying on the environment;
- the 2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Surveying Operations (the Code);
- restrictions in Marine Mammal Sanctuaries and the Te Rohe o Te Whānau Puha / Kaikōura Whale Sanctuary;
- prohibitions in marine reserves under the Marine Reserves Act 1971;
- coastal plans created under the Resource Management Act 1991 (RMA).

The current management regime creates some tension between protecting and conserving biodiversity (which can include avoiding effects or mitigating risks), managing the environmental effects of activities, and allowing for sustainable use of resources.

One important tool in the current regime is the *2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Surveying Operations* (the Code). It was developed by DOC, with stakeholder input, as a voluntary measure to apply throughout New Zealand continental waters¹⁹. The Code aims to minimise disturbance to marine mammals from seismic surveys and provides practical mitigation measures to manage the most significant effects of seismic surveying on marine mammals.

The Code was incorporated into the Exclusive Economic Zone and Continental Shelf (Environmental Effects – Permitted Activities) Regulations 2013. As a result, seismic surveying became a permitted activity in the exclusive economic zone provided it complied with the Code.

Most existing marine mammal sanctuaries have restrictions on seismic surveying which are different to the requirements of the Code. Seismic surveying was restricted in marine mammal sanctuaries before the Code was developed, and, in most cases, sanctuary restrictions provide less protection than the requirements of the Code. For example, in existing marine mammal sanctuaries, pre-survey consultation and assessment of potential impacts are not required, on-water monitoring and mitigation requirements are less rigorous, and reporting requirements are less robust. Additional monitoring and mitigation requirements cannot be added to reduce risks. Voluntary compliance with the Code within sanctuaries is also not universal and there is no ability to legally enforce compliance.

Thus, there is greater protection to Hector's and Māui dolphins from the effects of seismic surveying outside marine mammal sanctuaries than inside them.

There are risks to marine mammals from seismic surveying that cannot be managed. There is complex propagation of airgun pulses and difficulty in monitoring smaller, cryptic, and/or deep-diving species (for example, Hector's and Māui dolphins, beaked whales, and sperm whales). There are also limitations to the effectiveness of at-sea monitoring, a lack of baseline data, and other biological and acoustical complications or unknowns.

The current regime provides limited powers for the Government to exercise discretion, particularly where greater protection may be appropriate due to the sensitivity of animals or habitats or where there is greater uncertainty around potential effects. For example, there is no ability in the existing marine mammal sanctuaries to require additional controls to reduce risk (for example, because of sensitivity of animals or habitats, or uncertainty around potential effects). Nor can a seismic survey be prevented in a sanctuary, or in a specific area within a sanctuary, when risks cannot be appropriately mitigated.

7.2. Proposals in the consultation document

Several proposals were presented in the consultation document for managing the risk of seismic surveying to Hector's and Māui dolphins.

Retaining the current restrictions on seismic surveying in existing marine mammal sanctuaries was not proposed as an option given the anomalous situation of there being less protection for

¹⁹ New Zealand continental waters means the territorial sea; the waters of the exclusive economic zone; and, the waters beyond the outer limits of the exclusive economic zone but over the continental shelf of New Zealand.

Hector's and Māui dolphins inside marine mammal sanctuaries than in places outside them. In addition, the risk resulting from the lower standard of protection in sanctuaries, difficulty in monitoring for small dolphins, and inability to impose additional controls on seismic surveys, have the potential to result in unacceptable risks to Māui and Hector's dolphins in marine mammal sanctuaries, which must be managed to achieve the proposed vision and goals of the TMP.

While coastal plans developed under the RMA could be used to partly address some of these concerns, this approach would require multiple regional councils amending their plans over time, with inconsistent outcomes likely. Additionally, the scope and purpose of the RMA relates to the sustainable management of resources generally and is much broader than protecting a particular marine mammal (as enabled under the MMP Act).

The consultation document noted the proposed options would allow the Government to control potential effects of seismic surveys on Hector's and Māui dolphins in sanctuaries in a consistent manner and alleviate uncertainties for the industry, iwi and others.

All proposed options would apply equally to seismic surveying undertaken for commercial (petroleum and mining) purposes, as well as non-commercial (academic or other research) purposes.

The proposals involving prohibitions to seismic surveying (or seabed mining) would not apply to existing Crown Minerals Act permit holders or any subsequent permits granted with respect to those existing permits. Residual risks to dolphins from activities undertaken pursuant to existing Crown Minerals Act permits would remain but were proposed to be reduced for seismic surveys by applying Option 1 (compliance with the Code) or Option 2 (a permit under the MMP Act).

Three proposals for managing seismic surveying were presented in the consultation document.

Option 1: Require compliance with the Code in marine mammal sanctuaries

Under this proposed option, restrictions in marine mammal sanctuaries would be revised to require compliance with the Code. DOC would continue to be responsible for compliance and enforcement of the sanctuary restrictions.

9(2)(h)



Option 1 would result in a regime in sanctuaries consistent with the requirements in the EEZ, allowing surveys which cross between the two areas to operate under a common set of rules.

Costs associated with this change would be expected to be small. DOC already administers the Code and is responsible for enforcing restrictions in sanctuaries. Furthermore, the petroleum industry and other surveyors already comply with the Code as a regulatory requirement in the EEZ and generally also comply as a voluntary measure elsewhere.

Option 2: Require a permit under the MMP Act in marine mammal sanctuaries

Under proposed Option 2, seismic surveying (including by existing permit holders) would be prohibited in a sanctuary unless authorised by a permit issued by the Minister of Conservation. The permitting regime would be established by regulations following standard processes for developing regulations, including consultation with iwi, the public and industry. These regulations would be referenced through restrictions imposed under section 22(3) of the MMP Act. The latter would also require public consultation and the consent of other Ministers of the Crown (including the Minister of Energy).

The permit regime was proposed to include:

- a process for applying for a permit and for assessing the application;

- power to grant or decline a permit for seismic surveying;
- power to impose conditions;
- a process for public submissions (similar to the current permitting process for commercial marine mammal watching activities);
- criteria for granting or declining a permit.

This new regime would rely on the basic provisions of the Code as a foundation for management, with additional conditions applied if considered appropriate. It is also proposed to include “Level 3” surveys (that is those with the smallest acoustic source; as defined in the Code) for consistency with current protection in sanctuaries. Applicants would need to submit with their applications the same type of information currently required by the Code, and permits could be granted (with conditions) or declined.

Under the new regime, a written application (accompanied by the prescribed fee) would be required from every person wanting a permit to conduct a seismic survey in a marine mammal sanctuary. Information requirements for applications would be set out in the regulations and are likely to be similar to the marine mammal impact assessment and mitigation plans currently required by the Code.

Matters for assessment are likely to include:

- information submitted with the application (referred to above, and to be set out in the regulations);
- any additional information as to the potential effects on marine mammals notwithstanding the implementation of planned monitoring and mitigation measures;
- DOC’s assessment of potential risks associated with the application, considering geographic area, duration, intensity of noise produced, and so forth;
- any submissions received in relation to the application;
- relevant views of iwi, hapū or whānau, including under the Marine and Coastal Area (Takutai Moana) Act 2011 as appropriate.

The criteria for granting a permit are likely to include a requirement for the protection, conservation and management of marine mammals, reflecting the overall purpose of the MMP Act.

Revising the sanctuary restrictions to require a permit for seismic surveying would address the problems identified within the current regime by:

- providing a process whereby a decision-maker can consider any additional information about the effects on marine mammals, notwithstanding the implementation of the monitoring and mitigation measures planned for a survey;
- providing a legal basis to impose additional conditions or decline a permit (in whole or in part) to conserve or protect marine mammals, if supported by the evidence;
- using the Code as the basis for management in a sanctuary, addressing the current geographic inconsistencies inside and outside sanctuaries.

Developing the permitting regime for Option 2 would require considerable policy work (and therefore costs for DOC and other relevant government departments, notably MBIE, MfE and the EPA). This policy work will be carried out if TMP decisions include a permitting regime within their scope.

DOC would incur some additional ongoing costs if Option 2 was implemented. These would depend upon the exact process for processing a permit application, including whether public submissions were required. If not, costs would be similar to those for processing other complex permit applications under the MMP Act.

Industry and researchers would incur costs in preparing an application. Further information about potential costs has been provided by petroleum industry submitters, detailed in section 6.3 below.

Option 3: Prohibition of seismic surveying in marine mammal sanctuaries

Under this proposed option, seismic surveying would be prohibited in marine mammal sanctuaries to eliminate risk to Hector's and Māui dolphins from this activity.

Exceptions to this prohibition would be included for urgent hazard assessments in sanctuaries similar to what is provided for in the Te Rohe o Te Whānau Puha / Kaikōura Whale Sanctuary.

Exceptions would also be included consistent with the Crown Minerals (Petroleum) Amendment Act 2018. The prohibition would not apply to existing Crown Minerals Act permit holders or any subsequent permits granted with respect to those existing permits. Any seismic survey undertaken in a sanctuary under these exceptions would be subject to the restrictions as defined by Option 1 or Option 2 above.

The proposed prohibition would address the problems identified with the current regime by minimising the potential for surveys to be undertaken that could not be managed to an appropriate level of risk to the dolphins.

All three options would require marine mammal sanctuary restrictions to be amended or imposed under Section 22 of the MMP Act.

Option 2 (requiring a permit under the MMP Act in marine mammal sanctuaries) still requires considerable policy work to establish the details of a permit regime and potentially how this regime interacts with other legislation. This policy work will be carried out if TMP decisions include a permitting regime within their scope.

The three options are also interlinked with the proposed area extensions for the West Coast North Island Marine Mammal Sanctuary and the Banks Peninsula Marine Mammal Sanctuary (see section 6).

7.3. Economic/financial considerations

The Crown Minerals (Petroleum) Amendment Act 2018 had the effect of prohibiting any new petroleum permits being issued throughout New Zealand waters, so Option 3 would have no additional economic or financial impact. Surveys undertaken under exemptions to the prohibition (e.g. associated with existing Crown Minerals Act permits) are likely to incur additional costs, depending on whether Option 1 or 2 was chosen for management of those surveys.

Additional costs to industry of Option 1 should be limited, as the Code is already being used to manage effects of seismic surveying on marine mammals in the EEZ and has not unduly restricted industry activity.

Potential implications of Option 2 are greater, insofar as a permitting system could result in an application being declined or granted with conditions. Permit conditions may add further operational requirements/costs which in effect could also potentially prevent some surveys being undertaken. There could also be lost economic opportunity costs for operators and crown revenue due to petroleum products not being utilised.

7.4. Submissions

Submissions included those:

- a. Supporting the use of the Code to manage potential effects of seismic surveying on the dolphins. Petroleum industry and some other submitters believe the Code is already sufficiently precautionary to manage the potential effects and other proposals are not scientifically justified.
- b. Supporting the proposed permitting regime for seismic surveying as a middle ground which allows petroleum activities to continue but allows additional controls to be applied.
- c. Supporting the proposed prohibition on seismic surveying in sanctuaries.
- d. Considering the proposed prohibitions do not go far enough, and that seismic surveying should be prohibited further offshore than what is proposed (i.e. including a 'buffer zone' outside the sanctuary or to a depth contour of 100 metres), and/or be extended to include existing Crown Minerals Act permit holders.

Submissions focussed mostly on the West Coast North Island Marine Mammal Sanctuary (and extension area), the only sanctuary where there are existing petroleum permits. However, general industry comment about justification and support for the use of the Code would also apply to the South Island sanctuaries.

Several iwi organisations made submissions including Te Ohu Kaimoana, Te Kotahitanga o Te Atiawa, Ngā Hapu o Te uru o Tainui, Ngāti Ruanui, Te Rūnanga o Ngāi Tahu, and the Iwi Collective Partnership.

The Petroleum Exploration and Production Association of New Zealand (PEPANZ) presented a substantial submission including their views on the proposals. PEPANZ has amongst its members most of the major petroleum exploration and production companies in New Zealand. Other major petroleum industry submissions were from PGS (a seismic surveying company), Greymouth Petroleum, and the International Association of Geophysical Contractors (IAGC). There was commonality between these industry submissions.

Submissions were also received from Councils potentially affected by the proposed sanctuary amendments: Auckland Council, Waikato Regional Council, Taranaki Regional Council, and Canterbury Regional Council.

Other substantive submitters included a range of environmental NGOs, Conservation Boards, tourism operators, scientists, and other individuals.

Key aspects from submissions are provided below.

Iwi, hapu and whanau

Iwi, hapu and whanau submitters who commented on seismic surveying held generally similar views. Ngāti Ruanui wanted seismic surveying prohibited in their Te Moananui a Kupe and its extension to the full continental shelf, including for current permit holders. Te Rūnanga o Ngāi Tahu supported the protection of Hector's dolphins from the impacts of seismic surveys. Ngā Hapu o Te uru o Tainui (Customary Regional Fisheries Forum) submitted that there should be more research on seismic surveying and no more permits for oil exploration, seismic surveys and drilling within Māui dolphin habitat. The Iwi Collective Partnership objected to exemptions for existing Crown Minerals Act permit holders and submitted all threats should be managed with immediate measures implemented to reduce risk.

Industry: Effects of seismic surveying noise on Māui and Hector's dolphins do not justify proposed measures

Industry submissions generally held the view that noise from seismic surveying poses little or no risk for Hector's and Māui dolphins. PEPANZ noted "*Māui and Hector's dolphins use short, high frequency clicks, at a frequency of around 125 kHz (i.e. 125,000 Hz). These frequencies are orders of magnitudes higher than the frequencies produced by a marine acoustic source, which are below 200 Hz. For this reason, official documents refer to research showing that the probable frequency-specific sensitivity of Hector's dolphin means that the risk of auditory impairment from seismic surveys is low.*"

Industry: support for the Code if additional restrictions are required

In general, industry submissions indicated an acceptance of the use of the Code to manage potential effects of seismic surveying.

PEPANZ considered the Code is already sufficiently precautionary to address potential effects and that a permitting system or prohibition is unwarranted.

Industry: the current regulatory regime for seismic surveying under the RMA is appropriate

Several industry submissions noted that rules on offshore noise in coastal plans created by Regional Councils under the RMA were sufficient to address concerns about seismic surveys, and the RMA was preferred to the MMA Act as it allows 'balanced' consideration of economic costs versus protection of dolphins.

PEPANZ submitted that future surveying in the territorial sea will only be in the Taranaki Coastal Marine Area due to the restrictions implemented by the Crown Minerals (Petroleum) Amendment Act 2018; therefore, rules created under the Taranaki Regional Coastal Plan would be sufficient to address risks from all seismic surveying activities in the vicinity of the dolphins.

Industry: a permitting regime would come with significant costs and uncertainty for industry

PEPANZ and PGS submitted estimates of costs associated with a permitting regime ranging from \$45,000-130,000, depending on the location of the survey.

PEPANZ noted that a risk and cost benefit analysis would be needed to justify a more restrictive regime.

PGS expressed a view that a permit should only be required if a survey was wholly (at least 75%) within a sanctuary.

Industry: permitting regime is not sufficiently defined

Several submitters noted that the criteria to be considered when granting or declining a permit application are not sufficiently developed. It is unclear what conditions could be imposed, on what basis an application could be declined, whether a declined application could be appealed, and so forth.

Industry: seismic surveying is needed outside a permit area to survey the permit area

PEPANZ noted that to effectively survey a permit area, seismic survey data are also needed from outside the permit area. A prohibition which does not allow this to happen will have significant impacts on the benefits of surveys.

Councils: coordination is needed to implement decisions

Taranaki Regional Council submitted that a permitting regime is appropriate but should be developed with them to ensure alignment and a streamlined process for applicants, as they are currently proposing seismic surveying be a controlled activity under their Draft Coastal Plan.

Auckland Council noted seismic surveying is a restricted discretionary activity under the Auckland Unitary Plan. Waikato Regional Council submitted that a whole-sanctuary approach would be preferable to management of seismic surveying under multiple regional coastal plans. Canterbury Regional Council submitted that a permitting system is most appropriate.

Other submitters: support for seismic surveying prohibition and further protection

'Form submissions' overwhelmingly sought Hector's and Māui dolphins to be protected from seismic surveying with most seeking it to be prohibited throughout the dolphins' range.

Non-industry written submissions (non-form submissions from individuals, scientists, environmental NGOs and other organised groups) which commented on seismic surveying mostly sought seismic surveying to be prohibited over greater areas; e.g. across the full range of Māui and Hector's dolphins; out to the 100-metre depth contour; out to 20 nautical miles; across the continental shelf; around the entire South Island; along the east coast of the North Island; and the inclusion of buffers. Some sought the prohibition to also apply to existing Crown Minerals Act permit holders (meaning there would be a total prohibition on seismic surveying for petroleum and minerals).

These submissions were consistent in their view that seismic surveying will have significant impacts on Hector's and Māui dolphins. The majority viewed seismic surveying as being totally inconsistent with Hector's and Māui dolphin protection and sought it to be prohibited throughout the dolphins' habitat/range irrespective of the numbers present. Some noted the need to adopt the precautionary principle, especially where information on impacts is limited.

7.5. Comment

Benefits of the proposals for Hector's and Māui dolphins will depend on what restrictions are implemented and where, including the extent of any sanctuary extensions.

In terms of the protection, conservation and management of Hector's and Māui dolphins, it is not possible to quantify the predicted benefits of the various proposals, or to put any firm timeframes on them (they are likely to take decades or longer to be evident). At a basic level, the bigger the area protected (offshore and along-shore), the greater the likely benefits, though this will also depend on relative habitat value and the likelihood of seismic surveying being undertaken there. Relative benefits will generally decrease with distance away from the core area of dolphin habitat; i.e. benefits on an area-by-area basis will decrease offshore and along-shore into the proposed southern extension to the West Coast North Island Marine Mammal Sanctuary.

While improved levels of protection should be beneficial for the long-term welfare of both subspecies, population recovery will also be influenced by multiple factors (including population biology, other human threats, environmental variables, and other management interventions) and could take many decades or longer. Particularly for Māui dolphins, population recovery is likely to be very slow because of the very small current population size. Range extension of Māui dolphins south of Taranaki could take even longer.

However, not being able to quantify the predicted benefits or put timeframes on them is not considered a reason for doing nothing. Additional protection measures are considered necessary to ensure the subspecies recover and thrive, and to achieve the MMP Act's purpose of protecting, conserving and managing marine mammals. Even small potential effects across the full range of threats need to be managed if the goals of the TMP are to be achieved, particularly for the critically endangered Māui dolphin.

The proposal to require compliance with the Code in sanctuaries (Option 1) should have little impact on current operators because this approach mirrors what is currently required in the EEZ (where most seismic surveying has been carried out) and the Code is generally adopted voluntarily by operators in the territorial sea. Industry submissions were largely supportive of Option 1.

Option 1 is a significant improvement over the current regulatory approach within marine mammal sanctuaries but, of the three options presented in the consultation document, would leave the most risk to Hector's and Māui dolphins from seismic surveying.

The proposed permitting regime (Option 2) could have significantly increased potential benefit for the dolphins, though this will depend on the detail of the regime (e.g. scope, decision-making criteria, levels of discretion, etc). It also adds the greatest uncertainty and economic risk for applicants, especially as operations could be constrained through permit conditions or applications could potentially be declined. The amount of uncertainty and financial risk will change depending on the detail of the permit regime, including the assessment criteria and any right of appeal included in the process.

Existing Crown Minerals Act permit holders are proposed to be exempted from the proposed prohibition on seismic surveying in sanctuaries (Option 3). The exemption would also need to apply to seismic surveying immediately adjacent to a permit area to allow the whole permit area to be surveyed effectively (a point raised in the PEPANZ submission). This exemption would allow existing permit holders to continue exploration and production within their permit areas to maximise the longevity of their fields' production.

Option 3 would reduce risks to dolphins via prohibitions on seismic surveying, though the benefits are limited because of the proposed exemptions for existing Crown Minerals Act permit holders and urgent hazard assessments in sanctuaries. In addition, because the Crown Minerals (Petroleum) Amendment Act 2018 prohibits new offshore petroleum exploration permits, there are only limited circumstances where seismic surveys might be undertaken other than under the exemptions noted above.

However, if the permitting regime (Option 2) was used to manage any surveys undertaken under these Option 3 exemptions, the same uncertainty and economic risk as described above would apply to them unless the regime was implemented in a manner which intentionally reduced such uncertainty. For example, the permitting regime could specify that permits must be granted, similar to controlled activity status under the Resource Management Act 1991. This approach would likely align the MMP Act requirements with the RMA requirements in the Taranaki region, but enable the Minister of Conservation to impose conditions consistent with the protection, conservation and management of the dolphins.

In relation to Option 2, considerable policy work would be needed for regulations to be developed and implemented. Questions and concerns which arose during consultation would be addressed during this subsequent phase. Creating regulations would require a separate submissions and decision-making processes over and above any in-principle decisions on the TMP. Thus, industry will have a full opportunity to consider and submit on the detailed permitting process at the time. A full regulatory impact assessment would also be required.

Policy design for a permitting regime would need to address matters including information requirements, timeframes, process for public input, clear decision-making criteria, discretionary versus controlled activity status, and any appeals process.

Submissions made by PEPANZ and PGS noted consultation fees would be a significant cost for any surveys subject to a permitting regime. These submissions indicated costs in the range of \$45,000-130,000, depending on the location of the survey. DOC does not have the expertise to evaluate the accuracy of these numbers but accepts a permitting regime is likely to carry costs for survey companies. Industry has previously indicated large-scale surveys can cost more than \$100,000 per day, so the permitting costs, while substantial, are not out of scale with overall costs of a survey. For smaller surveys or academic research, however, permitting costs could be a significant or prohibitive cost.

While the status quo was not presented as an option in the consultation document, it is an option which could be considered. For the reasons outlined above (notably because there is *“less protection for Hector’s and Māui dolphins inside marine mammal sanctuaries than in places outside them”*), the status quo is not recommended as a tenable option for managing risk to Hector’s and Māui dolphins. No submitters have put forward an explicit case for the status quo (though several suggested seismic surveying should not be restricted at all), indicating a general acceptance that the current restrictions can be improved by implementing Option 1 as a minimum.

Specific issues raised in submissions are addressed below. All points are from the PEPANZ submission unless otherwise indicated. Other matters relating to marine mammal sanctuary extensions are addressed in Section 6.

Effects of seismic surveying on Māui and Hector’s dolphins and further restrictions

PEPANZ noted Māui and Hector’s dolphins communicate in frequencies which *“are orders of magnitudes higher than the frequencies produced by a marine acoustic source”*.

Lucke *et al* (2019) concluded the risk of hearing impairment is *relatively* low and noted that behavioural effects are most likely (which is true of all surveying and all species). They also stated: *“the optimal techniques to mitigate physical or behavioural effects...is avoidance of areas and implementation of additional buffer zones when dolphins are using them for biologically important activities, coupled with strict adherence to existing or activity-specific monitoring and mitigation schemes when activities are permitted to occur.”*

The risk of hearing impairment due to seismic surveying for these dolphins is relatively low, but this is not the only risk the activity poses for the dolphins. Potential behavioural effects, while difficult to quantify, deserve consideration for further management in line with advice provided by Lucke *et al* (2019) to reduce overall risk to the dolphins.

The PEPANZ submission quoted the Supporting Information and Rationale document as stating that *“with the exceptions of toxoplasmosis and fishery bycatch, no other anthropogenic*

causes of death were identified."²⁰ This quote above is incomplete and should read "with the exceptions of toxoplasmosis and fishery bycatch, no other anthropogenic causes of death were identified *in necropsied individuals*.". The latter caveat is important context, as it is only for a handful of individuals for which we have necropsy data. There are almost certainly other individuals which died due to anthropogenic causes (e.g. boat strike) but which were not recovered or necropsied.

It is very unlikely seismic surveying is responsible for any direct mortality of the dolphins, but as noted above, behavioural effects are worthy of consideration for further management.

The current regime provides limited powers for the Government to exercise discretion, particularly where greater protection may be appropriate due to the sensitivity of animals or habitats or where there is greater uncertainty around potential effects. For example, there is no ability in the existing marine mammal sanctuaries to require additional controls to reduce risk (for example, to restrict surveying at night when visual observation, the most effective monitoring method, is not available). Nor can a seismic survey be prevented in a sanctuary, or in a specific area within a sanctuary, when risks cannot be appropriately mitigated.

The 2018 petroleum exploration law change means the Taranaki Coastal Plan manages all remaining seismic surveys in the coastal marine area

PEPANZ noted: "*The [Crown Minerals (Petroleum)] Amendment Act 2018 means that seismic surveys will only be associated with existing permits. All existing permits in the Coastal Marine Area are in the Taranaki region (except for the Waikato-located Petroleum Exploration Permit 38479, which is due to expire in September 2019).*"

While this may be true for petroleum exploration, seismic surveying can be undertaken for other reasons. Thus, the location of existing petroleum permits cannot be assumed to represent the only areas where surveys may be undertaken.

Relationship between the Taranaki Coastal Plan and Crown regulations

PEPANZ noted: "*Taranaki Regional Council's Proposed Coastal Plan states that seismic surveys must comply with DOC's Code of Conduct.*"²¹ They further noted that if DOC "*imposed Option 2 (a new permitting regime) this would directly clash with the impending Taranaki Coastal Plan's requirement for compliance with the DOC Code of Conduct.*"

Under the current regulatory framework and as a matter of public policy generally, it is not uncommon for different authorisations to be required for the same activity under different legislation with different purposes. For example, permits under the Wildlife Act and MMP Act are required when activities harm protected species, in addition to complying with the RMA or EEZ Act requirements as applicable. Surveys which cross between the EEZ and sanctuaries already encounter the issue of different regulatory requirements in different places.

Regional coastal plans, and decisions made under them, are all under the Resource Management Act (RMA), which has a different purpose than the MMP Act. The scope and purpose of the RMA relates to the sustainable management of resources generally and is much broader than protecting a particular marine mammal (as enabled under the MMP Act). Also, regional coastal plans do not provide the same certainty as a national regime (e.g. regional coastal plans may be amended through plan changes). While regional coastal plans could be used to partly address some concerns, this approach would require multiple regional councils amending their plans over time, with inconsistent outcomes likely.

The draft Taranaki Coastal Plan proposes that seismic surveys are a controlled activity in the Taranaki Coastal Marine Area, which would allow additional conditions to be applied to seismic surveying beyond the requirements of the Code. The Taranaki Regional Council has submitted in support of a permitting system, noting that it should be developed with the Council to ensure alignment and a streamlined process for applicants. How this will work in practice will be subject to Minister's decisions and subsequent policy development and implementation.

²⁰ P106 <https://mpigovtnz.cwp.govt.nz/dmsdocument/34974>.

²¹ PEPANZ supports this rule.

Greater protection from seismic surveying

Non-industry submissions that commented on seismic surveying overwhelmingly sought the activity to be prohibited throughout Hector's and Māui dolphin habitat, including across larger areas. Some sought existing permit holders to be included in the prohibition.

These options were not presented in the consultation document. They would provide greater protection for Hector's and Māui dolphins, though their relative benefits on an area-by-area basis will generally decrease with distance away from the core area of dolphin habitat (i.e. offshore and along-shore). Seismic surveying is not expected to directly cause dolphin mortality.

7.6. Conclusions

The consultation document proposed options to manage the potential effects of seismic surveying on dolphins, including:

- Option 1: Requiring compliance with the Code in marine mammal sanctuaries;
- Option 2: Requiring a permit under the MMP Act in marine mammal sanctuaries; and
- Option 3: Prohibiting seismic surveying in marine mammal sanctuaries (with exemptions).

Although the prohibition option set out in the consultation document would not affect existing Crown Minerals Act permit holders (noting the point raised by PEPANZ about the need to also undertake seismic surveying in areas immediately adjacent to the permit area), the other options will have potential impact on petroleum exploration and development opportunities. Compliance with the Code or requiring a permit under the MMP Act will create costs for survey companies. In addition, the permitting requirement may create uncertainty linked to an application being declined (or overly onerous permit conditions) which industry consider unacceptable.

Each of these options will provide greater protection to dolphins than the status quo. The benefits are potential and cannot be quantified. The relative level of protection clearly increases from Option 1 to Option 2 due to the ability under a permitting regime to apply additional controls to reduce risks. Option 3 adds marginal additional protection, given most surveys likely to be proposed in sanctuaries will qualify for the exemptions (i.e. will be associated with existing CMA permits) and therefore not be prohibited. The option proposed by most environmental submitters (complete prohibition with no exemptions) would provide the greatest level of protection.

There is scope within the sanctuary proposals to consider other options. For example, although Options 2 and 3 in the consultation document were proposed to apply to all sanctuaries, either could be limited to the West Coast North Island Marine Mammal Sanctuary, where the risk is greatest due to the Nationally Critical status of Māui dolphin.

If a permitting system is proposed, substantial policy development and public consultation would be required to implement the regime.

8. SEABED MINING IN MARINE MAMMAL SANCTUARIES

8.1. Background Information

Seabed mining is currently managed through three principal statutes – the Crown Minerals Act for the allocation of rights to extract Crown-owned minerals; the EEZ Act for assessing the environmental effects of applications in the EEZ; and the RMA for mining applications in the territorial sea. Some regional councils may have objectives, policies and methods included in their respective regional coastal plans relating to seabed mining.

The exception to this approach is in the West Coast North Island Marine Mammal Sanctuary where seabed mining is prohibited out to two nautical miles along the full length of the

sanctuary, and out to four nautical miles from south of Raglan Harbour to north of Manukau Harbour (Figure 2) pursuant to the restrictions established under the sanctuary²².

The current regulatory approach means, in terms of environmental effects of seabed mining, each mining operation is assessed on a case by case basis under either the RMA or the EEZ Act (or potentially both Acts for operations straddling the boundary between the territorial sea and the EEZ). Under both the RMA and EEZ Act, the effects on Māui and Hector's dolphins are considered alongside other environmental effects as well as economic matters in terms of managing the use, development, and protection of natural resources. Applications can be contentious, litigious and costly, and there is no certainty as to outcome.

Providing for additional controls to protect Hector's and Māui dolphins specifically (as opposed to managing adverse effects on the environment generally) is appropriate under the MMP Act given its purpose of protecting, conserving and managing marine mammals.

Two large offshore applications have been processed under the EEZ Act: Trans-Tasman Resources for iron sand in the South Taranaki Bight²³ and Chatham Rock Phosphate for phosphate nodules and minerals on the Chatham Rise²⁴. Two minerals exploration permits have also been issued under the Crown Minerals Act off the west coast of the North Island (Figure 2). One permit (Ironsands Offshore Mining Limited) is mostly within the existing West Coast North Island Marine Mammal Sanctuary. The second exploration permit (Trans-Tasman Resources Limited) is outside the existing sanctuary but within the range of Māui dolphin and within the proposed southern extension of the sanctuary.

Seabed mining (for minerals other than oil and gas) typically involves large processing ships using mechanical/suction dredges to extract and pump sediment and associated minerals from the seafloor to the surface for processing. Unwanted sediments are discharged back into the sea either at the surface or at depth.

The three main components of seabed mining with the potential to affect dolphins are underwater noise, direct seabed disturbance, and the discharge of sediments. Noise and sediment plume effects (including turbidity) may extend kilometres from the source.

Hector's and Māui dolphins rely on sound for communication, sensing their environment and hunting prey. Noise from mining operations has the potential to limit the dolphins' ability to communicate, sense predators, and forage.

Turbidity plumes may also affect dolphin habitat. Although Hector's and Māui dolphins are known to inhabit coastal waters and river plume areas where turbidity is high, recent observations along the Kaikōura coast following the 2016 earthquake indicate dolphins may be changing their distribution and, in some cases, avoiding areas at times when sedimentation/turbidity levels are particularly high (water clarity < 50 cm)²⁵.

Prey may also alter their distribution in response to noise, sediment plumes, or altered seabed habitat. This has the potential to affect the ability of the dolphins to find food, with flow-on effects for the health of individual dolphins or dolphin populations in the area.

Collectively these effects, if sufficiently large, may result in the affected area becoming sub-optimal as Hector's or Māui dolphin habitat, or in extreme cases, lead to partial or full displacement. The severity of these impacts, however, will be context and scale dependent and will vary depending on a range of interrelated factors including:

- location;
- spatial and temporal scale of the operation;
- the technology being used and methods for mitigating adverse effects;
- other activities occurring in the territory, for example, shipping and commercial fishing;

²² See clause 6 of the Marine Mammals Protection (West Coast North Island Sanctuary) Notice 2008 which prohibits mining, as specified in the area described in Schedule 3, except for mining for petroleum or a minimum impact activity.

²³ Decision currently under appeal, Court of Appeal.

²⁴ Application declined. This area is not Hector's dolphin habitat.

²⁵ Dr Jody Weir, Kaikōura Ocean Research Institute Inc. Pers. comm.

- the physical and biological characteristics of the environment, for example, depth/bathymetry, hydrodynamics, benthic habitats;
- the specific characteristics of the effects, for example, frequency-dependent noise levels, noise attenuation, sediment plume footprint;
- the area affected at any given point in time (noting the total operational area will be much larger than the area being mined on any day);
- which subspecies (Hector's or Māui dolphin) is present;
- the importance of the affected area for Hector's or Māui dolphins; for example, is the area core dolphin habitat or on the fringes of their distribution?

Apart from theoretical or modelled assessments for individual consent applications (for example, noise production and attenuation, and habitat modelling), no studies have been undertaken to assess the effects of seabed mining on Hector's or Māui dolphins. No seabed mining has been undertaken in an area where Hector's or Māui dolphins occur, meaning there has been no opportunity to monitor effects. Thus, there is no direct experimental or similar evidence that shows seabed mining adversely affects Hector's or Māui dolphins. Experimental research would require substantial funding and would necessitate intentional exposure of the dolphins to mining activity. The small number of Māui dolphin would also significantly hamper such research if undertaken along the west coast of the North Island.

Establishing (or disproving) a direct link between seabed mining and population-level effects for Hector's or Māui dolphins is also hampered by the difficulty of undertaking research on long-lived, slowly reproducing animals, as such effects might take decades or more to be seen. These animals are also exposed to a variety of human activities and environmental variables over the course of their lives, which would make it difficult to attribute effects to a single activity.

The Māui dolphin population is very small (63 dolphins aged 1+ (95% CL 57-75)) and is classified as Nationally Critical under the New Zealand Threat Classification system. The current state of the population supports the implementation of protection measures to ensure the subspecies recovers and thrives. Even small potential effects will need to be managed to achieve the goals of the TMP.

The current prohibition on seabed mining within the West Coast North Island Marine Mammal Sanctuary extends out to two and four nautical miles (Figure 2) but does not include the full range of Māui dolphins offshore or alongshore. Residual risks to Māui dolphins from the effects of seabed mining remain in these unprotected waters.

Māui dolphin densities are highest closer to shore with most validated sightings within four nautical miles of the coast. Validated sightings and acoustic detections decrease with increasing distance offshore. The great majority of these records occur inside seven nautical miles from shore, but occasional records occur out to at least eight nautical miles off the Manukau coast. Extending the seabed mining prohibition within the West Coast North Island Marine Mammal Sanctuary out to eight nautical miles would avoid any direct overlap between mining and this known range. A greater distance (for example, to 12 nautical miles) would add a greater degree of protection by creating a buffer for effects such as noise and sedimentation which may spread well beyond the immediate location of a mining operation. It would also account for any Māui dolphins venturing further offshore than eight nautical miles; the furthest acoustic detection of a Hector's or Māui dolphin is 9.8 nautical miles off the Manukau coast.

South of the existing West Coast North Island Marine Mammal Sanctuary, there is the risk of seabed mining acting as a barrier to Māui or Hector's dolphin movements up and down the coast, including connections with dolphin populations closer to Cook Strait. Having a protected near-shore corridor (e.g. two nautical miles from shore) along these southern shores could help reduce impediments to dolphin movements.

Although the current regulatory approach may be sufficient for managing the effects of seabed mining on Hector's dolphins through much of their range, a greater degree of protection in the four existing South Island marine mammal sanctuaries (Clifford and Cloudy Bay, Banks

Peninsula, Catlins Coast, and Te Waewae Bay) could be beneficial for the long-term welfare of this subspecies given the higher densities of dolphins in these core areas. Ensuring there is a near-shore corridor with no significant impediments to dolphin movements up and down the coast could help retain connectivity between areas and reduce the risk of fragmentation of subpopulations. Prohibiting seabed mining within two nautical miles of the coast in the four South Island marine mammal sanctuaries (including the proposed extensions to the Banks Peninsula Marine Mammal Sanctuary outlined earlier) would help provide for such a corridor in these core dolphin areas.

8.2. Proposals in the consultation document

The consultation document proposed a range of options for managing seabed mining in marine mammal sanctuaries depending on the degree of protection sought. Some of these proposals were not mutually exclusive and could be implemented as a package of changes.

The proposed prohibitions would not apply to existing Crown Minerals Act permit holders or any subsequent permits granted with respect to those existing permits. This approach would enable a transition to a new management regime for mining activities while providing greater protection for Hector's and Māui dolphins than exists under the status quo. Residual risks to dolphins from activities undertaken pursuant to existing Crown Minerals Act permits would remain. DOC would continue to engage in statutory processes under the RMA and the EEZ Act to help ensure risks to dolphins from seabed mining operations are considered and mitigated.

Option 1: the status quo, including maintaining the current prohibition on mining within the existing West Coast North Island Marine Mammal Sanctuary out to two and four nautical miles (and maintaining the current exceptions for mining for petroleum and minimum impact activities) (Figure 2).

Option 2: prohibition on mining within the existing West Coast North Island Marine Mammal Sanctuary out to 8 nautical miles (and maintaining the current exceptions for mining for petroleum and minimum impact activities) (Figure 2).

Option 3: prohibition on mining within the existing West Coast North Island Marine Mammal Sanctuary out to 12 nautical miles (and maintaining the current exceptions for mining for petroleum and minimum impact activities) (Figure 2).

Option 4: prohibition on mining out to 2 nautical miles within the proposed southern extension of the West Coast North Island Marine Mammal Sanctuary (and maintaining the current exceptions for mining for petroleum and minimum impact activities) (section 6; Figure 2).

Option 5: prohibition on mining within 2 nautical miles of the coast within the four South Island marine mammal sanctuaries (Clifford and Cloudy Bay, Catlins Coast, Te Waewae Bay, and Banks Peninsula including the proposed extensions noted above) (and maintaining the current exceptions for mining for petroleum and minimum impact activities) (section 5; Figure 4).

8.3. Economic/financial considerations

There are likely to be economic consequences for Options 2, 3 and 4 given the known interest in offshore mining for iron sand (and co-occurring vanadium) along the west coast of the North Island. These effects relate to lost economic development opportunities rather than effects on existing permitted activities given none of the proposals will affect existing Crown Minerals Act permit holders (or any subsequent permits granted with respect to those existing permits).

These economic costs will vary depending on how far offshore any additional seabed mining prohibition extends (for example, two, eight or 12 nautical miles), with costs generally increasing with distance offshore. Prospectivity and therefore effects are likely to decrease closer towards Wellington.

The economic consequences of Option 5 should be comparatively low considering the inshore locations of the sanctuaries along the South Island's eastern and southern coasts where mineral prospectivity is likely to be limited.

Existing mining operations for construction sand within Kaipara Harbour would not be affected by the proposals because the harbour is excluded from the current seabed mining prohibition and the new proposals are for offshore extensions only.

Socio-economic values extend beyond market values. They also include non-market economic values (see section 4) as well as other cultural and social values which New Zealanders derive from protecting Hector's and Māui dolphins.

8.4. Submissions

Submissions ranged from those (not mutually exclusive):

- a. Supporting the status quo. Industry and some other related submissions believe the proposals are unjustified and will have significant unnecessary economic impacts.
- b. Supporting the proposed seabed mining closures within sanctuaries (out to 2, 8 or 12 nautical miles, plus the proposed extensions to the West Coast North Island and Banks Peninsula sanctuaries). Most of these submissions sought the greatest distance offshore.
- c. Considering the proposed closures do not go far enough, and that seabed mining should be prohibited further offshore than what is proposed, and/or beyond the existing sanctuaries, or to a depth contour of 100 metres.

Aspects of submissions relating to the TMP's proposed vision, goals and objectives are not addressed here; response to these matters are being addressed separately for the final advice paper.

Industry submissions focused mostly on the West Coast North Island Marine Mammal Sanctuary (and the proposed southern extension), the region where there has been the greatest mining interest. Prospectivity in the other sanctuaries is comparatively low and there was no industry comment about these specifically. However, general industry comment about justification and support for the status quo would also apply to these South Island sanctuaries.

Trans-Taman Resources Limited (TTR) presented a substantial submission (including a large appendix detailing the information the company submitted as part of its seabed mining applications off the South Taranaki coast). TTR has three existing Crown Minerals Act permits off the south Taranaki coast (Figure 2). The other major seabed mining industry submission was from Straterra. Submissions were also received from various individuals (including TTR investors) and smaller companies supporting seabed mining. There was commonality across these 'industry' submissions.

Non-industry submissions were more general in their approach and almost universally opposed seabed mining.

Key aspects from submissions are provided below. Italicised industry quotes are taken directly from the TTR submission unless otherwise noted.

Iwi, hapu and whanau

Te Rūnanga o Ngāti Ruanui Trust recommended application of the precautionary principle and strongly supported prohibitions on seabed mining in their Te Moananui a Kupe, including extensions over the full continental shelf and removing the proposed exemption for existing Crown Mineral Act permit holders. The Nga Hapu o Te uru o Tainui Customary Regional Fisheries Forum submitted there should be more research on seabed mining and no more permits for seabed mining within Māui dolphin habitat. Te Rūnanga o Ngāi Tahu supported the protection of Hector's dolphins from the impacts of seabed mining within their takiwā. The Iwi Collective Partnership objected to exemptions for existing Crown Minerals Act permit holders and submitted all threats should be managed with immediate measures to reduce risk.

Industry: support for the status quo

The status quo was the preferred option across all industry submissions. Fisheries Inshore New Zealand opposed the Minister of Conservation having powers over seabed mining in the proposed sanctuary extensions.

Industry: the current regulatory regime for seabed mining under the RMA and EEZ Act is appropriate

Industry submissions noted:

- Applications for consents can be approved or declined, and effects are avoided, remedied or mitigated, providing a *“balanced ‘sustainable management’ decision making process.”*
- There is no consideration of the role of regional councils (notably the Taranaki Regional Council) and interaction with coastal plans. Overlapping regimes are *“unlikely to be workable and would represent poor public policy.”*²⁶
- *“A sanctuary should not be implemented to provide the Minister of Conservation with discretionary powers to control activities that are already subject to wider regulatory provisions. there are existing permitting and regulatory provisions in place to manage such activities. We cannot accept therefore the need for additional prohibitions to be implemented which would deny utilisation opportunities.”*²⁷
- *“Decision-making needs to be evidence and fact based and not open to subjective, political discretion.”*²⁸

Industry: criticism of the science/risk assessment process and consequently how it has been used to inform the TMP

Industry submissions stated:

- The scientific community is divided on the utility of the risk assessment including modelling and outputs, and that key recommendations of the expert review panel were not addressed in the final modelling.
- Without technically robust scientific information, there is a risk of ineffective management measures which unnecessarily and inappropriately restrict activities.

Industry: management options are not based on evidence or robust scientific data

Industry submissions noted:

- The proposals appear to be predetermined and are not evidence-based²⁹.
- The TMP process has not appropriately or accurately assessed the potential impacts of seabed mining on Hector's or Māui dolphins.
- There is no formal quantitative spatial or risk assessment undertaken for seabed mining. *“There is no specific exploration of potential seabed mining impacts using either quantitative or non-quantitative means and the review has largely ignored the extensive material provided during the recent TTR consent processes... TTR note that the mitigation measures and recommended conditions were developed with, and supported by, DoC as part of the application process.”*
- There is no evidential certainty the proposed sanctuary measures, including the area extension, will achieve the goals in terms of population increase and species protection.
- The effects of seabed mining can only be understood following monitoring of the activity. Further research under the TMP should include research on seabed mining and its effects.
- *“The management approach to exclude seabed mining from an area on the basis that it is simply part of the ‘full range of Māui dolphins offshore or alongshore’ seems illogical.”*

²⁶ PEPANZ

²⁷ Fisheries Inshore New Zealand

²⁸ Straterra

²⁹ Straterra

Industry: a “blanket” management approach is inappropriate when the effects are dependent on scale and scope and are not sufficiently identified or understood

Industry submissions stated:

- Such an approach will “unfairly prejudice existing users” and lead to a “restrictive environmental regime focussed on preservation rather than sustainable management.”
- “The development of management options appears to have been a subjective exercise with a focus on restricting activities rather than a data driven process. The TMP should provide for the delivery of protection against known and documented threats before addressing less certain threats particularly where there are existing legislation and regulatory frameworks in place which control all impacts and effects, both positive and negative, of activities...”

Industry: there is insufficient evidence to support a transition zone in the South Taranaki Bight or seabed mining restrictions within it

TTR noted there are very few Māui dolphins in the south Taranaki Bight area, including TTR’s permit areas, and that the amount of overlap between TTR permit areas and Māui dolphin habitat is very small. Other matters raised included:

- Mining activities are “highly unlikely to be impacting (or even overlapping) on Māui dolphin or their current habitat.”
- “There is no evidence that transition zones without seabed mining will operate any differently to transition zones with mining.”

Industry: the proposed seabed mining prohibitions out to 8 or 12 nautical miles are unjustified

Industry submissions stated:

- “Within the STB, there is enough accepted evidence to support the ‘preferred’ habitat of both Hector’s and Māui dolphins being the near-shore environments out to 2 nautical miles and potentially even out to 4 nautical miles in some areas. However, as previously stated, there is insufficient evidence to support that ‘preferred’ habitat extending beyond these areas within the STB and within most of the existing West Coast North Island Marine Mammal Sanctuary...”
- “Sightings out to 8 nautical miles are rare and difficult to substantiate, and accordingly, limited weight should be applied to these.”
- Effects on dolphins will be temporary and the dolphins can relocate within their habitat range to avoid adverse effects.

Industry: inconsistencies between proposed measures (e.g. distance from shore) for managing fisheries impacts and those for seabed mining in the South Taranaki Bight

TTR refer to proposed prohibitions out to three distances for the South Taranaki Bight (2, 8 or 12 nautical miles)³⁰ and compares these with proposed fisheries restrictions ranging between 2 and 7 nautical miles.

Industry: support for a 2-nautical mile prohibition zone

Notwithstanding its other concerns, TTR stated it “could theoretically support a 2 nautical mile prohibition zone south of the existing sanctuary but only where the prohibition was applied consistently to all activities including commercial, recreational and other fisheries, and other non-fishing threats.”

Industry: resource/economic effects ignored

The lack of socio-economic assessments was criticised by industry, as was the lack of a geological assessment of mineral resources/wealth. Other matters raised by industry included:

- Impacts on the future development of the industry with resulting socio-economic costs.
- Minerals are important for New Zealand transitioning to a low carbon economy.

³⁰ Note: the consultation document only has an option for prohibiting seabed mining out to 2 nautical miles in the southern extension to the West Coast North Island Sanctuary. It would appear TTR has misunderstood the proposals.

- The area of seabed likely to be mined is very small because of the realities of commercial mining, and *“infinitesimal compared with the area being protected or that proposed.”*³¹

Other submitters: support for seabed mining prohibitions and for greater protection

‘Form submissions’ overwhelmingly sought Hector’s and Māui dolphins to be protected from seabed mining with most seeking seabed mining to be prohibited throughout their range.

Written (non-form) submissions which commented on seabed mining (including from individuals, scientists, environmental NGOs and other organised groups) mostly agreed with the proposals but many also sought seabed mining to be prohibited over greater areas; e.g. across the full range of Māui and Hector’s dolphins; out to the 100-metre depth contour; out to 20 nautical miles; across the continental shelf; around the entire South Island; and along the east coast of the North Island. Some sought the prohibition to also apply to existing Crown Minerals Act permit holders (meaning there would be a total prohibition on all seabed mining).

These submissions were consistent in their view that seabed mining will have significant impacts on Hector’s and Māui dolphins; i.e. through the effects of noise, sedimentation, habitat loss and prey impacts. The majority viewed seabed mining as being inconsistent with Hector’s and Māui dolphin protection and sought it to be prohibited throughout the dolphins’ habitat/range irrespective of the numbers present. Some noted the need to adopt the precautionary principle, especially where information on impacts is limited.

The Taranaki Regional Council noted any restrictions should occur through *“appropriate economic, cultural and environmental assessments in appropriate legal frameworks, rather than via the narrow, limited and indirect HMTMP process.”* However, the submission also states the council does not oppose the introduction of additional prohibition areas to ensure Māui and Hector’s dolphins are adequately protected, with support for options 2 and 4.

Te Korowai o Te Tai o Marokura sought seabed mining to be prohibited in Te Rohe o Te Whānau Puha Whale Sanctuary *“to further protect the habitat of all cetaceans and their prey into the future.”*

8.5. Comment

Responses to submissions are addressed generally and specifically below.

Support for the status quo

The seabed mining industry supports the status quo, submitting mining consents are best assessed on a case-by-case basis under the RMA and/or EEZ Act with a *“balanced ‘sustainable management’ decision making process”*³².

The status quo was one of the options presented in the consultation document. This option would not result in any improved protection for Hector’s and Māui dolphins from the effects of seabed mining.

The scope and purpose of the RMA and EEZ Act relate to the sustainable management of resources generally and are much broader than the purpose of the MMP Act. It is open to consider a management regime under the MMP Act which has a more focussed purpose – the protection, conservation and management of marine mammals.

TTR submitted a seabed mining prohibition under the MMP Act would affect the role of Regional Councils and regional coastal plans would have to be amended. This is incorrect. As noted above, under the current regulatory framework and as a matter of public policy generally, it is not uncommon for different authorisations to be required for the same activity under different legislation with different purposes. For example, permits under the Wildlife Act

³¹ Straterra submission

³² TTR submission

or the MMP Act are required when activities harm protected species, in addition to complying with the RMA or EEZ Act requirements as applicable. The Taranaki Regional Coastal Plan would not need to be amended if seabed mining was prohibited under the MMP Act in parts of the territorial sea. There is already spatial overlap between the Taranaki RCP and the existing seabed mining prohibitions in the West Coast North Island Marine Mammal Sanctuary. In this regard, it is noted the Taranaki Regional Council stated the council does not oppose the introduction of additional prohibition areas to ensure Māui and Hector's dolphins are adequately protected.

Extended seabed mining prohibitions – management options are not evidence-based

Much of the industry criticism centred on the amount and quality of information available on the impacts of seabed mining on Hector's and Māui dolphins. Industry submissions:

- were very critical of the level of information being insufficient to base sound decisions on; i.e. decisions are not supported by robust science or the known distribution of dolphins;
- asserted a 'blanket' management approach is inappropriate when the effects are dependent on scale and scope and are not sufficiently identified or understood.
- contended Māui dolphins can relocate if necessary, that they prefer coastal inshore areas, and occasional offshore sightings should be given little weight.

Māui dolphins could *relocate* away from where seabed mining is being carried out. Viewed another way, dolphins may be *displaced* from the area. The significance of this displacement will depend on the habitat quality, the size of the area from which dolphins are displaced (fully or partially), and for how long. Seabed mining operations are expected to operate 24/7, year-round, and over many years.

Māui dolphin densities are highest closer to shore with most validated sightings within four nautical miles of the coast. Validated sightings and acoustic detections occur beyond this distance, though decreasing in occurrence with increasing distance offshore. The great majority of these records occur inside seven nautical miles from shore, but occasional validated records occur out to at least eight nautical miles off the Manukau coast.

Care needs to be taken when interpreting sightings records. Māui dolphins are rare, dispersed, cryptic and, therefore, difficult to observe/locate. Visual sightings records are a function of dolphin presence, their detectability, and people being there to observe and record a sighting. Sightings may reflect both the distribution of dolphins and of the observers, and the latter can have a large bias on the data. Thus, apart from well-designed systematic surveys, sightings data are generally indicative only. Given the very small number of Māui dolphins, the low probability of detection, and the population's risk of extinction, even a few sightings offshore are considered significant.

The consultation document included proposals to prohibit seabed mining prohibitions in the existing West Coast North Island Marine Mammal Sanctuary within eight or 12 nautical miles of the shore. The former would avoid any direct overlap between mining and Māui dolphins within this range. It would also provide greater protection for dolphins closer to shore given the effects of noise and sedimentation may spread well beyond the immediate location of a mining operation (see below). Twelve nautical miles would add a greater degree of protection by creating a further buffer against the effects of noise and sedimentation. It would also account for any Māui dolphins venturing further offshore than eight nautical miles; the furthest acoustic detection of a Hector's or Māui dolphin is 9.8 nautical miles off the Manukau coast.

Seabed mining is unlikely to cause direct mortality, though population level effects are possible through indirect mechanisms such as reduced foraging and reduced reproductive success. Auditory impairment (i.e. permanent or temporary hearing loss) from mining noise is also

considered only a minor risk for Hector's and Māui dolphins especially given their assumed³³ hearing sensitivity in the higher frequency ranges. Effects of seabed mining on Hector's and Māui dolphins are much more likely to be behavioural or through habitat modification. In this regard, the spatial risk assessment did not limit itself to mortality effects and included some qualitative or semi-quantitative assessments including for noise.

Underwater noise, direct seabed disturbance, and the discharge of sediments are likely to be the three main mechanisms for seabed mining affecting Māui and Hector's dolphins. However, no empirical studies have investigated the impacts of seabed mining on Hector's and Māui dolphins and no scientifically robust data are available on behavioural responses of the dolphins to sound exposure (Lucke *et al.* 2019). There have been no mining operations undertaken in Hector's and Māui dolphin habitat which could have allowed for scientifically robust monitoring to be undertaken, notwithstanding issues associated with the very small number of Māui dolphins from both scientific and conservation perspectives.

While Lucke *et al.* (2019) identified behavioural disturbance, exclusion, and habitat destruction as risks, they also noted:

- *"...the paucity of information available on Hector's and Māui dolphins substantially reduces the validity of conclusions on quantifying long-term effects of O&G and mineral exploration and production."*
- *"Discussing and concluding on potential impacts of O&G and mineral activities on Hector's/Māui dolphins is hampered by the overarching lack of knowledge about their sensitivity to the relevant stressors."*
- *"... much of the available marine mammal information and impact assessment advice is based primarily on marine mammal distribution information (e.g. sighting, breeding, feeding-spatial information) and expert knowledge (i.e., qualitative observation), rather than site-specific empirical observations."*
- *"no concrete risk assessment can be made."*

Thus, the generality and limitations of the available information are fully acknowledged.

In terms of future research, Lucke *et al.* (2019) noted *"...behavioural reactions to underwater sound are a major knowledge gap and investigating this aspect [e.g. through "controlled and replicated exposure experiments"] requires immediate attention to reliably inform any conservation efforts such as the revised TMP. Alternatively, in the absence of appropriate information a precautionary approach should be used to prevent any undesired behavioural effects."* The authors also recommended the following research topics to help address some of the fundamental information gaps.

- Long-term noise monitoring.
- Measurement of hearing sensitivity.
- Auditory masking.
- Behavioural response study.
- Satellite telemetry.

None of these research topics are simple, all would be very expensive and take a long time, and some would require captive experimentation. The latter poses significant animal ethics and public acceptability issues.

Lucke *et al.* (2019) noted: *"Sound emitted from dredging activities associated with mining for minerals is broadband, with most energy below 1 kHz. In general, sound levels are too low to expect animals to suffer physical harm, but auditory masking is likely to occur. If conducted near or in a sanctuary/distribution area, dredging has clear potential to cause behavioural reactions due to the sounds emitted and the presence of the vessel(s). Entrainment, habitat*

³³ From acoustic vocalisations, anatomy of their hearing apparatus, and auditory information from proxy species (in this case the Harbour Porpoise) (Lucke *et al.* 2019).

degradation, noise, contaminant remobilisation, suspended sediments, and sedimentation can affect benthic, epibenthic, and infaunal communities, which may impact marine mammals indirectly through changes to prey.” Auditory masking may affect dolphin communications, echolocation/hunting, and threat (predators and vessels) avoidance.

Noise was a key issue discussed by marine mammal experts during the TTR hearings, though evidence was also presented on wider sediment plume effects on coastal habitats and communities (including reef systems). Experts agreed (with one expert dissenting) on noise conditions to help mitigate the effects of noise (i.e. noise thresholds at 500 metres³⁴). This approach does not avoid adverse effects on marine mammals; behavioural disruption may occur around the mining vessel, including displacement closer to the ship and potentially beyond this 500 metres distance.

The US National Oceanic and Atmospheric Administration (NOAA) marine mammal acoustic thresholds³⁵ cite 120 dB rms for “*behavioural disruption for continuous noise*” (e.g. from sources such as drilling and mining). Based on a sound source of 188 dB³⁶, noise from a seabed mining operation may exceed the NOAA threshold of 120 dB rms in shallow coastal waters for tens of kilometres from the source³⁷. The risk of behavioural disturbance will increase closer to the source. Even a higher threshold of 130 dB³⁸ would be exceeded for several kilometres from the source.

The available evidence indicates impacts of seabed mining are likely to be sublethal but extend for significant distances from the source. Technology will have a big influence on noise production as well as other variables (e.g. sediment production and dispersal) and, therefore, effects on marine mammals. Effects will also be related to the scale of the operation (spatial and temporal) and the amount of overlap with species’ distribution and abundance patterns, and habitat value. In terms of management responses, Lucke *et al.* (2019) concluded: “*The optimal techniques to mitigate physical or behavioural effects of anthropogenic activities on Hector’s and Māui dolphins is avoidance of areas and implementation of additional buffer zones when dolphins are using them for biologically important activities, coupled with strict adherence to existing, or activity-specific monitoring and mitigation schemes when activities are permitted to occur.*”

In terms of the protection, conservation and management of Hector’s and Māui dolphins (and in line with the advice regarding the seismic surveying options) it is not possible to quantify the predicted benefits of the various seabed mining proposals, or to put any firm timeframes on them (they are likely to take decades or longer to be evident). At a basic level, the bigger the area protected (offshore and along-shore), the greater the likely benefits, though this will also depend on relative habitat value and the likelihood of seabed mining being undertaken there. Relative benefits will generally decrease with distance away from the core area of dolphin habitat; i.e. benefits on an area-by-area basis will decrease offshore (e.g. from four to eight to 12 nautical miles) and along-shore into the proposed southern extension to the West Coast North Island Marine Mammal Sanctuary.

While improved levels of protection should be beneficial for the long-term welfare of both subspecies, population recovery will also be influenced by multiple factors (including population biology, other human threats, environmental variables, and other management interventions) and could take many decades or longer. Particularly for Māui dolphins,

³⁴ *The overall combined noise level at 500m shall not exceed 130dB re 1µPa RMS linear in any of the following frequency ranges: low frequency 10-100 Hz, mid-frequency 100-10,000 Hz, and high frequency >10,000 Hz and that the overall combined noise level at 500m across all frequencies shall not exceed a sound pressure level of 135 dB re 1µPa RMS linear.* Questions remained regarding the achievability of these metrics given the possible noise levels of the processing ship and dredge unit.

³⁵ https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

³⁶ Based on evidence presented by Dr. Simon Childerhouse for TTR, 2014.

³⁷ Using a mid-spreading transmission loss model (15 x LogR). Sound transmission loss tends to be more cylindrical than spherical in shallower waters due to the reflective properties of the seafloor and the surface of the sea.

³⁸ 10 dB difference = 10 times greater sound intensity

population recovery is likely to be very slow because of the very small current population size. Range extension of Māui dolphins south of Taranaki could take even longer.

However, not being able to quantify the predicted benefits or put timeframes on them is not considered a reason for doing nothing. Additional protection measures are considered necessary to ensure the subspecies recover and thrive, and to achieve the MMP Act's purpose of protecting, conserving and managing marine mammals. Even small potential effects across the full range of threats need to be managed if the goals of the TMP are to be achieved, particularly for the critically endangered Māui dolphin.

As noted in section 6, the proposed two-nautical mile seabed mining prohibition in the South Taranaki Bight will provide less direct benefit to Māui dolphins than proposals to the north of Cape Egmont which is where the great majority of the dolphins currently occur.

The proposed two-nautical mile seabed mining prohibition in the South Taranaki Bight (and in the four South Island marine mammal sanctuaries) was designed primarily to allow for population connectivity by providing a near-shore corridor for dolphins to move along the coast. Noise attenuation is reduced in shallow coastal waters, meaning noise from seabed mining at or close to the two-nautical mile line would extend inshore and at levels which are predicted to cause behavioural disruption for dolphins all the way to the coast. However, this does not mean dolphins would be necessarily deterred from travelling along the coastline, though in the absence of empirical monitoring or experimental data, it is not possible to be certain. While two nautical miles provides some protection (see earlier discussion regarding noise propagation/attenuation), it may not remove all risk of disturbance; a wider exclusion zone would reduce the risk further. This latter option would be outside the range of measures consulted on. Reducing the width is not recommended.

Fisheries and seabed mining in the South Taranaki Bight

TTR's submission refers to proposed seabed mining prohibitions out to 2, 8 or 12 nautical miles in the South Taranaki Bight and inconsistencies between approaches for fishing and seabed mining. However, the consultation document only proposed the one distance of 2 nautical miles. It would appear TTR has misunderstood the proposals.

TTR stated it could theoretically support a 2-nautical mile prohibition zone south of the existing sanctuary *"but only where the prohibition was applied consistently to all activities including commercial, recreational and other fisheries, and other non-fishing threats."* Fisheries options presented in the consultation document included proposals to restrict set netting and trawling in this area.

Effect on existing seabed mining

The proposed two nautical mile seabed prohibition within the South Taranaki Bight would have no impact on TTR's existing permits/operations.

The proposed prohibitions on seabed mining stated they would not apply to existing Crown Minerals Act permit holders or any subsequent permits granted with respect to those existing permits. Moreover, seabed mining in the southern extension to the West Coast North Island sanctuary was only proposed to be prohibited within two nautical miles of shore (proposed option 3), which does not overlap with TTR's permit areas (see Figure 2). [Note TTR's statement *"there are three options for the management of seabed mining in the STB with three different prohibition zones (2, 8 or 12 nautical miles)"* is incorrect.] TTR also noted it *"could theoretically support a 2 nautical mile prohibition zone south of the existing sanctuary but only where the prohibition was applied consistently to all activities including commercial, recreational and other fisheries, and other non-fishing threats."*

Resource/economic effects

Existing Crown Minerals Act permit holders are specifically excluded from and, therefore, would be unaffected by the proposals presented in the discussion document.

MBIE commissioned RSC Consulting³⁹ to undertake an independent assessment of mineral resource prospectivity off the west coast of the North Island using existing publicly available information. RSC Consulting (2019) identified considerable *in situ* co-occurring iron sand (iron and titanium) and vanadium off the west coast of the North Island, outside areas already closed to seabed mining within the West Coast North Island Marine Mammal Sanctuary. **Table 2** presents mid-range estimates (\$NZ) from RSC Consulting (2019); that report also included low and high range estimates.

Table 2. Estimated *in situ* mineral resources (\$NZ mid-range estimates) for west coast North Island, north and south of Oakura⁴⁰

Area (nautical miles)	Iron sand value		Vanadium (V ₂ O ₅) value	
	North	South	North	South
0-12	180 Billion	[140 Billion]	240 Billion	[180 Billion]
0-8	130 Billion	[100 Billion]	170 Billion	[130 Billion]
0-2	N/A	30 Billion	N/A	40 Billion

Note: Resources within areas closed to seabed mining in the existing West Coast North Island Marine Mammal Sanctuary are excluded. Estimates in square brackets include resources in offshore areas outside the proposals consulted on.

When interpreting these data, the following important factors should be noted (quoted text is taken directly from RSC Consulting (2019)):

- The assessment is of mineral resource prospectivity; it is not an economic assessment. Wider economic values were not assessed. Operational factors/practicalities or other constraints (e.g. resource consent requirements) were also not considered.
- The estimates are only for resources within the territorial sea. Mineral resources beyond 12 nautical miles are excluded (i.e. in the EEZ, including the area applied for by Trans-Tasman Resources in the South Taranaki Bight).
- The estimates are cumulative totals (i.e. 0-2, 0-8 or 0-12 nautical miles) rather than differential amounts.
- Estimates in square brackets include resources outside the proposed 2-nautical mile seabed mining closure in the proposed southern extension to the marine mammal sanctuary (i.e. a substantial proportion of these resources are unaffected by the proposals outlined in the consultation document).
- There is high variability in assumptions of important estimation parameters (e.g. bulk density, thickness of sediments, magnetic mineral grade, and commodity price). This variation *“has a significant impact on the in-situ dollar values for ironsand and V₂O₅, which range from NZD30–860B for ironsand and NZD50–1,400B for V₂O₅ for the area within the 12 NM limit.”*
- *“It is against international reporting guidelines ... to present exploration potential as in-situ dollar values, without demonstrating that enough work has been done to classify an Ore Reserve. It is therefore important to see such appraisals in the context of an order-of-magnitude financial valuation in line with a specific request made for such information by NZPAM.”*

³⁹ RSC Consulting 2019. Offshore mineral assessment: Technical Report on Offshore Mineral Assessment, West Coast, North Island, New Zealand. Report prepared for: New Zealand Petroleum and Minerals, Energy and Resource Markets Branch, Ministry of Business, Innovation and Employment. 31 August 2019.

⁴⁰ RSC Consulting 2019) included the following legal disclaimer: *“Under no circumstances shall NZPAM, or its contractors or employees quote to outside sources any of the information in this Report without due form or context, or without the explicit prior written permission from RSC. For the avoidance of doubt, this particularly includes statements that single out overall dollar values of the in-situ material to media or other public outlets.”*

- *“In-situ values do not represent a recoverable or economic value and should not be used for forward-looking economic analyses. However, it is fair to assume that a large part of the material may be demonstrated to be potentially economically extractable with further exploration work.”*
- *“The ranges will have a large amount of uncertainty and will be based on conceptual geological models, limited amounts of data and data that has undergone little or no quality control. It is important that the numbers are not used to support any future economic operations. The estimated grade and tonnage ranges should be considered to reflect a low-level of confidence.”*

Prohibiting seabed mining across larger areas and for existing Crown Minerals Act permit holders

Non-industry submissions which commented on the seabed mining proposals mostly sought seabed mining to be prohibited:

- Out to the 12-nautical mile limit (e.g. Option 3);
- Over larger areas than those proposed in the sanctuaries; e.g. to the 100-metre depth contour; or to 12-nautical miles in the South Taranaki Bight;
- Some also submitted seabed mining prohibitions should also apply to existing Crown Minerals Act permit holders (i.e. prohibiting seabed mining altogether).

The last two bullet points were not options presented in the consultation document. The exemption for existing Crown Minerals Act permit holders reflects a similar exemption currently in place for permit holders for oil and gas exploration/production.

Marine mammal sanctuary protection for reasons other than strictly the protection of Māui and Hector's dolphins (e.g. to protect other marine mammals, seabirds, seabed communities, kaimoana, etc) was also mentioned. Marine mammal sanctuaries cannot be used to protect species other than marine mammals, unless those measures are directly related to the protection, conservation and management of marine mammals. These wider issues were not consulted on through the TMP process.

As noted above, relative benefits of the proposals *“will generally decrease with distance away from the core area of dolphin habitat; i.e. benefits on an area-by-area basis will decrease offshore (e.g. from four to eight to 12 nautical miles) and along-shore into the proposed southern extension to the West Coast North Island Marine Mammal Sanctuary.”* Thus, any further additions to the closed areas proposed in the consultation document will have less benefit for the dolphins.

The proposed two-nautical mile seabed mining prohibitions in the South Taranaki Bight and the four east and south-coast South Island marine mammal sanctuaries were designed primarily to allow for population connectivity by providing a near-shore corridor for dolphins to move along the coast. The two-nautical mile corridor was not proposed for wider Māui or Hector's dolphin protection and it is not expected seabed mining would result in mortality of dolphins.

Numbers of Māui and/or Hector's dolphins in the South Taranaki Bight are comparatively very small so the benefits of protection measures are population connectivity and the potential for expansion of future larger populations into these areas.

Hector's dolphins in the four South Island marine mammal sanctuaries should be more resilient to potential effects of seabed mining owing to their higher population numbers, though as noted in the consultation document, population fragmentation remains a concern in these sanctuaries (and elsewhere). Hence the proposed two nautical mile seabed mining prohibition. The risk of seabed mining occurring in the east coast and southern South Island sanctuaries (or elsewhere along these coasts) is also low due to the low mineral prospectivity in these areas.

As noted earlier, while two nautical miles provides some protection for dolphin connectivity, it may not remove all risk of disturbance; a wider exclusion zone would reduce the risk further. However, this latter option is outside the range of measures consulted on.

Outside of any prohibited areas within the sanctuaries, seabed mining would still require consent under the RMA and/or the EEZ Act, allowing for adverse effects on dolphins to be avoided, remedied and mitigated in accordance with the relevant planning documents and provisions of the RMA. If considered appropriate, consents could be declined.

Te Rohe o Te Whānau Puha Whale Sanctuary

Te Rohe o Te Whānau Puha Whale Sanctuary was established under the Kaikōura (Te Tai o Marokura) Marine Management Act 2014 as a whale sanctuary pursuant to section 11.

Changing restrictions within Te Rohe o Te Whānau Puha Whale Sanctuary to protect all cetaceans as sought by Te Korowai o Te Tai o Marokura is beyond the scope of the TMP. Prohibiting seabed mining within parts of Te Rohe o Te Whānau Puha Whale Sanctuary for the purposes of protecting Hector's dolphins could be achieved by creating a separate marine mammal sanctuary overlaying all or relevant parts the whale sanctuary.

The consultation document proposed seabed mining to be prohibited in the West Coast North Island Marine Mammal Sanctuary and the Banks Peninsula Marine Mammal Sanctuary given the priority for protecting Māui dolphin and the significance of the Canterbury coast as Hector's dolphin habitat. The risk assessment and spatial habitat modelling did not identify sufficient risk along the Kaikōura coast to support a prohibition on seabed mining in that area. The likelihood of seabed mining occurring along this part of the South Island's east coast is also low.

8.6. Conclusion

Other than the status quo, the consultation document proposed seabed mining prohibitions out to:

- eight nautical miles in the existing West Coast North Island Marine Mammal Sanctuary;
- 12 nautical miles in the existing West Coast North Island Marine Mammal Sanctuary; and
- two nautical miles for the proposed southern extension to the West Coast North Island Marine Mammal Sanctuary and in the South Island sanctuaries.

Each of these options will provide greater protection to dolphins than the status quo, with benefits increasing with the size of the area protected. Relative (area-by-area) benefits will decrease with distance away (offshore and along-shore) from core dolphin habitat. The benefits are potential and cannot be quantified.

Although the proposals (as set out in the consultation document) would not affect existing Crown Minerals Act permit holders, they will have an impact on potential mineral wealth and future development opportunities.

Reduced or modified area/s (offshore and/or along-shore) could be considered. For example, although Options 2 and 3 the consultation document specified two set distances (eight and 12 nautical miles) for the existing West Coast North Island Marine Mammal Sanctuary, different offshore distances within these bounds, including a mix of distances in different areas, could also be considered. Seabed mining is currently prohibited out to two nautical miles along the full length of the existing sanctuary, and out to four nautical miles from south of Raglan Harbour to north of Manukau Harbour. Distances of four and eight nautical miles (or any other distances) for these sections of coast could be considered instead.

A total ban on seabed mining (i.e. including existing Crown Minerals Act permit holders) or establishing larger closed areas than those consulted on could also be considered.

9. DOLPHIN WATCHING AND VESSEL TRAFFIC

9.1. Background Information

Vessel traffic potentially affects Hector's and Māui dolphins in two principle ways: through disturbance (including noise) and collisions causing injury or death.

DOC has only one known record of a Hector's dolphin mortality from a vessel collision – a single dolphin off the east coast of the South Island. While it is likely injuries or mortalities from vessel strike go unnoticed or unreported, this solitary record indicates such incidents are unlikely to be common or widespread. Greatest risk will be in hot spot areas where there is greatest overlap between vessel activity (commercial and recreational) and dolphin distribution; for example, Akaroa.

A considerable amount of research has investigated the impact of marine mammal watching on dolphin behaviour in New Zealand and overseas. While different taxa respond differently to different levels of dolphin watching pressure, virtually all species have been observed to change their behaviour in response to vessels including changes to resting, milling, socialising, travelling, foraging/feeding and/or group cohesion. These behavioural changes may have flow-on effects for the welfare of individuals and local populations.

Research at Akaroa on Hector's dolphins has showed indications of both habituation and sensitisation to tourism activities. Vessels significantly affected the overall activity budget and certain behaviours of dolphins including:

- decreased travelling and increased milling in the presence of vessels and swimmers;
- decreased diving/foraging in the presence of vessels;
- increased diving with larger groups of swimmers.

Several aspects of the ecology and behaviour of Hector's and Māui dolphins make them vulnerable to potential disturbance. They are coastal, frequenting near-shore waters over the summer months when and where boating activity is highest. The peak in tourism and recreational boating activity (December to February) also coincides with the known calving period. They are also very small, are not strong or fast swimmers, and are mostly found in very small groups. In addition, Hector's dolphins show high site fidelity, with relatively small home ranges compared to other dolphins, and can be "boat positive" particularly with slower-moving vessels.

These attributes make Hector's dolphins an easy target for commercial and recreational vessels, with the possibility of the same small group/s of animals being approached repeatedly over the course of a day and over several days. Swimming interactions are considered more disruptive than viewing-only trips because they can involve more intrusive approaches and tend to have longer interaction times.

Vessel activity near marine mammals is managed under the MMPR through a permit regime for commercial marine mammal watching and rules governing people and vessel behaviour around marine mammals. Collectively, the permit regime and rules are intended to minimise the likelihood of both collisions and disturbance by vessels.

All tourism operators must have a commercial marine mammal watching permit issued by DOC under the MMPR. Permits include requirements governing matters such as species, area of operation, vessel type, type of interaction, duration of contact, and number and length of trips.

The MMPR impose a high degree of caution when considering whether to grant a commercial marine mammal watching permit. A permit cannot be issued unless the Director-General of Conservation is satisfied the proposed commercial operation will not have, or be likely to have, any adverse effect on the conservation, protection, or management of marine mammals. In addition, the Director-General must be satisfied the criteria in Regulation 6 of the MMPR have been substantially complied with.

The MMPR also allow for moratoria to be declared on issuing new permits. Regulation 15 states:

15 Director-General may decline to grant permits during specified period

(1) Where the Director-General believes on reasonable grounds that it is necessary for the protection, conservation, or management of any marine mammals or any class of marine mammals, he or she may, by notice published in—

(a) the *Gazette*; and

(b) newspapers circulating in the locality,—

declare that no new permits shall be granted in respect of specified commercial operations during the period specified in the notice.

(2) In considering whether or not to give notice under subclause (1), the Director-General shall have regard to—

(a) the number and effect of existing commercial operations; and

(b) whether or not it is in the interests of the conservation, protection, or management of marine mammals to grant further permits.

(3) A notice under subclause (1) may in like manner be amended or revoked.

Part 3 of the regulations stipulate general and specific operating rules which all vessels must adhere to including maximum speeds, orientation of approach and numbers of vessels within 300 metres. These rules apply to all recreational and commercial vessels irrespective of whether they are engaged in dolphin watching (the only exception being commercial fishing vessels that are actively fishing).

No commercial dolphin watching permits have been issued for viewing Māui dolphins specifically. One permit has been issued at New Plymouth which allows viewing of dolphins generally, though this permit is restricted to the Sugar Loaf Islands Conservation Area; the occasional Māui or Hector's dolphin may be seen in this area.

The Northland, Auckland and Waikato Conservation Management Strategies include the following policy:

Take a precautionary approach to the number of commercial operators involved in marine mammal operations, including seeking a moratorium on issuing of new permits if research and monitoring indicate that such a step is required.

Hector's dolphins are viewed commercially in some locations including the Marlborough Sounds, Kaikōura and Banks Peninsula. Akaroa is the main viewing location and while swimming with Hector's dolphins is allowed on some Akaroa-based permits, it has not been permitted elsewhere. There is a moratorium on issuing any new commercial permits at Akaroa which expires in 2026; no additional commercial effort can be considered until then. Further research is planned on the impacts of dolphin watching at Akaroa.

In addition to the MMPR, vessels are also required to adhere to various maritime rules administered by regional councils and Maritime New Zealand. For example, vessels must not exceed five knots within 200 metres of the shore except in designated exclusion areas. Whilst for different purposes, these controls may provide indirect protection for marine mammals close to the shore or in certain controlled harbour areas.

The MMPR provide strong regulatory control of dolphin watching through the permit regime and the operating rules in Part 3 of the regulations. The regulations generally provide an appropriate range and level of protection relative to the risk posed by vessel traffic.

Compliance/enforcement is an important part of the management of dolphin watching, and vessel strike generally, though remains a significant challenge especially for recreational vessels. DOC intends to continue current advocacy and outreach programmes in areas of high overlap between dolphins and vessels, to help ensure skippers are aware of and comply with the regulations as well as good boating practice.

Despite the relative difficulty in locating Māui dolphins, their high public profile may encourage people to apply for a commercial viewing permit. Given the known effects of vessel interactions on Hector's dolphins, and other dolphin species, there is a high risk of Māui dolphins being disturbed by repeated interactions should commercial tourism vessels target them. Such an outcome would be inconsistent with the MMPR and the objectives of the TMP.

9.2. Proposals in the consultation document

The consultation document proposed a moratorium on any new permits for commercial viewing of Māui dolphin. While it is unlikely a permit would be issued for targeted viewing of Māui dolphins commercially given the assessment requirements in the MMPR, declaring a moratorium under Regulation 15 (using the Director-General of Conservation's existing authority under this regulation) on new permits to view Māui dolphins would provide absolute certainty in this regard. Given Māui and Hector's dolphins are indistinguishable at sea, the moratorium would need to cover both subspecies and be area-specific (e.g. the West Coast North Island Marine Mammal Sanctuary).

The consultation document proposed no other changes to the current regulatory regime which otherwise is considered sufficient to ensure the goals of the TMP are achieved. A wider review of the MMPR, separate from this TMP review, is currently under consideration.

9.3. Economic/financial considerations

The proposed moratorium on new commercial permits to view Māui dolphins would have no effect on existing tourism operators because no permits have been issued under the MMPR for viewing them commercially.

New information on the economic benefits of Hector's dolphin tourism commissioned by Black Cat Cruises, Akaroa (M.E Consulting, 2018) is summarised in section 4 of this paper.

9.4. Submissions

Te Rūnanga o Ngāti Ruanui Trust supported the proposed moratorium on commercial permits to view Māui dolphins.

Ngāti Kuia Customary Fisheries submitted it is unacceptable for fishing to be further regulated while the tourism sector is unaffected, and that boat strike (plus pollution and natural threats) would have bigger impacts than either fishing or toxoplasmosis. Ngāti Kuia also stated the existing permit moratorium in the Marlborough Sounds denied them their rights in terms of ecotourism economic development.

Other submissions which commented on the proposed moratorium on commercial permits to view Māui dolphin were mostly supportive of the measure. Some submissions raised concerns about the impact of marine mammal tourism on Hector's dolphins at Akaroa and elsewhere. A precautionary approach to issuing permits was also recommended. Excluding shore-based viewing from the moratorium was also suggested.

The value of Hector's dolphins to tourism and 'brand New Zealand' was highlighted in the submissions from Black Cat Cruises, Tourism Industry Aotearoa and the Canterbury Conservation Board.

The Nelson Marlborough Conservation Board sought the current moratorium on new marine mammal watching permits in Queen Charlotte Sound to be extended over the entire Nelson-Marlborough region.

Specific matters mentioned in various submissions included:

- improved boater/fisher education;
- voluntary measures (e.g. closed areas);
- no surfing or swimming with Māui dolphins;
- closed areas for high speed vessels;
- limiting recreational vessel speeds and no following of Māui dolphins in the West Coast North Island Marine Mammal Sanctuary;

- management of power boat racing;
- keeping 500 metres from commercial fishing vessels while actively fishing;
- prohibiting tourism activities in core Hector's dolphin habitat; and prohibiting tourism at Banks Peninsula from November to February;
- proposals for improved monitoring of commercial tourism operators (electronic, cameras);
- improved compliance/enforcement (including better powers under the MMPR to prevent illegal non-permitted tourist activities);
- more research on the impact of recreational vessels and other pressures;
- the development of sound budgets to address cumulative impacts including from vessels;
- skipper and vessel licencing for all private boats.

9.5. Comment

Although the consultation document included a proposed moratorium on new permits to view Māui dolphins, this was done primarily to show the full suite of measures being considered by agencies. However, the decision to declare a permit moratorium under Regulation 15 of the MMPR rests solely with the Director-General of Conservation. Therefore, this decision sits outside the ministerial decision-making process under the TMP.

Commercial (and recreational) marine mammal watching is already strictly regulated under the MMPR. Regulation 12(3) provides appropriate protection as a permit cannot be issued unless the Director-General is satisfied:

- a) the proposed commercial operation will not have, or be likely to have, any adverse effect on the conservation, protection, or management of marine mammals;
- b) the criteria for issuing permits specified in regulation 6 of the MMPR have been substantially complied with; and
- c) sufficient information has been received.

Part 3 of the MMPR has regulations governing human activities and behaviour around marine mammals. These regulations apply for commercial and recreational vessels, and already manage risk to Hector's and Māui dolphins. Compliance with these regulations, especially for recreational boaters and fishers, is acknowledged to be a very significant challenge.

As noted above, there is a high risk of Māui dolphins being disturbed by repeated interactions should commercial tourism vessels target them. The proposed moratorium on new commercial permits to view Māui dolphin would be consistent with the MMPR and the objectives of the TMP. Although a moratorium would mean iwi or anyone else could not be granted a permit to view Māui dolphin, a moratorium is considered necessary to ensure Māui dolphins are protected appropriately.

Shore-based viewing of dolphins does not require a permit under the MMPR, meaning a specific exclusion for this activity is not required.

The suggestion to ban tourism activities in core Hector's dolphin habitat, or Fisheries Inshore New Zealand's proposal to prohibit tourism at Banks Peninsula from November to February (the calving period), are considered unnecessary. Decisions on marine mammal tourism are more nuanced than this and depend on a wide range of factors relating to the operation (e.g. trip type, vessel type, numbers of trips, type and duration of encounters) and local context. While research at Akaroa has shown tour-vessels affected the overall activity budget and certain behaviours of Hector's dolphins, the effects were considered acceptable in terms of the protection, conservation and management of the dolphins. There were no major "alarm bells" such as displacement and aversion. Swimming with Hector's dolphin calves is already prohibited and, unlike captures in set nets or trawls, well managed marine mammal tourism is unlikely to result in mortality.

There is already a moratorium on new permits at Akaroa and commercial swimming with Hector's dolphins has not been permitted elsewhere in Canterbury or the rest of New Zealand.

The Canterbury Conservation Management Strategy (and other CMS) requires a precautionary approach.

“Policy 2.9.3 Take a precautionary approach to the number of commercial operators involved in marine mammal operations in the area, including seeking a moratorium on the issuing of new permits if research and monitoring indicate that this is required.”

Akaroa is one of the most researched areas in New Zealand regarding the impacts of dolphin watching and further research is planned by DOC.

A moratorium on commercial dolphin and whale watching permits in the Marlborough Sounds has been in place since mid-2017 and was extended for a further 10 years in 2018. This extension was in recognition of the existing high levels of vessel activity in the Sounds (commercial permits, recreational boats, and other vessels) and concerns regarding the welfare of marine mammals, notably Hector’s dolphins and bottlenose dolphins. The moratorium was considered necessary for the protection, conservation and management of marine mammals in Queen Charlotte Sound, Tory Channel and Pelorus Sound. Marlborough Sounds iwi, including Ngati Kuia, were consulted on the 10-year extension.

The TMP is not static and other suggestions (e.g. research, monitoring, education, etc) can be picked up in the future. Research planning and education are important future actions. Proposals for improved monitoring of commercial marine mammal watching operators, including electronic monitoring, are already in the process of being implemented. A wider review of the MMPR, separate from this TMP review, is currently under consideration.

Some of the suggestions made in submissions go beyond what was consulted on (e.g. vessel speed limits in Māui dolphin core habitat) or have wider policy implications (e.g. skipper and vessel licencing; changes to the MMPR). Others could potentially be addressed through RMA plans and consents.

Vessel speed restrictions in core Māui dolphin habitat are a good idea but pose significant compliance issues especially given the remoteness of the area. Vessel safety may also be relevant. Skipper education is considered a better overall approach.

The wider economic worth of Hector’s and Māui dolphins for tourism and “brand New Zealand” is acknowledged. Information on economic benefits of Hector’s dolphin tourism commissioned by Black Cat Cruises, Akaroa (M.E Consulting, 2018) is noted earlier in section 4.

9.6. Conclusion

A moratorium on commercial permits (i.e. a declaration under regulation 15 of the MMPR) to view Māui dolphin is considered appropriate to protect Māui dolphins. Relevant submissions on the TMP consultation document should be made available to the Director-General when considering the proposed moratorium.

10. OTHER THREATS

10.1. Background Information

Oil spills

A large oil spill could present a catastrophic threat to Hector’s and Māui dolphins should one occur in their habitat range. Dolphins have been shown to experience elevated mortality after large-scale oil spills (such as bottlenose dolphins in the Gulf of Mexico after the Deepwater Horizon incident), most likely from exposure to petroleum products and chemicals used to control the spill, or from ecosystem-scale changes in prey distribution and availability.

A spatial risk assessment for oil spills was undertaken in 2015 for Maritime New Zealand and estimated approximately 99 percent of the oil spill risk originated from oil tankers, passenger vessels and cargo vessels, with relatively little contribution to risk from drilling and extraction activities.

The TMP risk assessment compared those results with Hector's and Māui dolphin distribution and estimated the highest risk to dolphins to be on the north side of Banks Peninsula, with relatively lower risk elsewhere.

The national framework for marine oil spill prevention, preparedness and response spans statutes including the Maritime Transport Act 1994, the Resource Management Act 1991, the Health and Safety at Work Act (HSWA) 2015, the Hazardous Substances and New Organisms Act 1996, and the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.

New Zealand's oil spill response capability is maintained (and developed) through partnerships between Maritime New Zealand, Regional Councils, the oil industry, and overseas agencies. In line with international practice and as provided for in the Maritime Transport Act 1994, New Zealand has a three-tiered approach to managing all aspects of marine oil spill preparation and response:

- Tier 1 oil spills – industry responsibility (for example, ships and oil transfer sites);
- Tier 2 oil spills – regional councils' responsibility;
- Tier 3 oil spills – Maritime New Zealand responsibility.

Those responsible for each tier are required to prepare for and respond to an oil-spill appropriate to their level of responsibility. Each tier can be escalated to the next, depending on the scale of the event.

Coastal development, other pollution, and sediment run-off

The coastal distribution of Hector's and Māui dolphins means they are more likely to be influenced by coastal development, pollution and sedimentation run-off than other dolphins. Effects may be direct (for example, point source or diffuse pollution, and noise from port-related activities) or indirect (for example, excessive sedimentation affecting benthic habitats and prey availability). Disturbance may be short-term and/or episodic (for example, noise from pile driving) or cumulative due to ongoing exposure (for example, sedimentation and pollution).

Pollution from industrial activities and terrestrial run-off can pose a significant risk to marine mammals because they are apex predators. Bioaccumulation of contaminants may occur, resulting in reduced individual fitness through compromised immune response, failure to produce offspring successfully, and other indirect effects on health. Contaminant levels, including for significant ones such as DDT and PCBs, are fortunately low in marine mammals in New Zealand relative to most industrialised nations.

Sedimentation run-off may be accelerated by land use activities, notably forestry, agriculture and urbanisation. Excessive sedimentation presents a significant threat to coastal marine ecosystems generally, and especially to benthic habitats. While Hector's and Māui dolphins are tolerant of turbid conditions and may be attracted to these waters for other habitat requirements (for example, predator avoidance), excessive sedimentation may lead to negative effects on their prey and, therefore, foraging success. Observations along the Kaikoura coast following the November 2016 earthquake indicate dolphins are now avoiding river mouth areas where there are very high post-quake sedimentation/turbidity levels.

Hector's dolphins may also be affected by some coastal infrastructure, notably port developments. For example, pile driving noise has been assessed as a threat to resident Hector's dolphins in Lyttelton Harbour and measures were implemented in relevant resource consents to manage these effects (for example, soft starts, shutdown procedures and monitoring zones).

The effects of coastal development, pollution and sedimentation run-off, including threats to Hector's and Māui dolphins, are currently managed by district and regional councils under the RMA through plans and regional policy statements and on a case-by-case basis through individual consents.

Infectious diseases (other than toxoplasmosis)

Infectious diseases, including toxoplasmosis, brucellosis, pneumonia and tuberculosis, were the cause of death for over half of the Hector's and Māui dolphins which have had necropsies undertaken and where cause of death could be determined. Toxoplasmosis is the main disease of concern and is addressed separately in this paper.

While the remaining diseases also cause dolphin mortality, levels are lower than for toxoplasmosis, and these diseases are widespread in the environment, meaning they cannot be realistically managed as part of a species focussed TMP. Furthermore, it is commonly the case that diseases of this kind primarily kill old or compromised or otherwise immune-suppressed animals, such that deaths arising from them may constitute "natural" mortality that serves to keep the population within its natural environmental carrying capacity, rather than external "human-caused" mortality that can be expected to suppress populations to levels lower than the environmental carrying capacity. In contrast toxoplasmosis appears to often kill otherwise healthy animals and originates only from cats (a source that cannot be considered natural for New Zealand wildlife). Nevertheless, diseases other than toxoplasmosis add important context for considering cumulative effects and the resilience of Hector's and Māui dolphins to other environmental and anthropogenic pressures. For example, animals affected by other non-lethal threats such as pollution, climate change, or seismic disturbance may be more at risk of becoming sick and dying of diseases that are commonly present but generally non-lethal.

Climate change

Ocean acidification (from increased levels of carbon dioxide in the atmosphere) and rising sea temperatures are very significant threats to marine ecosystems. Other climate-related threats include changes in ocean currents, increased storm activity and sea-level rise. Oceanic responses to climate change may cause widespread effects on ecosystems and food webs, with resulting impacts on apex predators including marine mammals. These effects may reduce the resilience of Hector's and Māui dolphins to cope with other anthropogenic pressures.

10.2. Proposals in the consultation document

The risk to Hector's and Māui dolphins from an oil spill, while potentially of high consequence, has a low likelihood of occurring and the overall risk is minimised by the existing response framework. A large-scale spill would present the biggest risk, but there are no obvious options to reduce this risk further. As such, the consultation document considered the existing management regime and associated mitigation measures have reduced the risk to the dolphins as much as possible. No additional measures were suggested for managing the risk of oil spills to Hector's and Māui dolphins.

The effects of coastal development, pollution and sedimentation run-off are highly variable depending on type, location, intensity and spatial and temporal scale. Given the large variability, effects on marine mammals can be appropriately addressed through relevant RMA plans and consents and the consultation document proposed DOC continue to engage in these RMA processes to ensure effects on Hector's and Māui dolphins are avoided, remedied or mitigated consistent with the Act's requirements.

No management measures were proposed in the consultation document to specifically address other infectious diseases. DOC plans to continue to investigate and support research on diseases affecting Hector's and Māui dolphins.

The consultation document did not propose addressing climate-related threats to Hector's and Māui dolphins through the TMP. Instead, it noted DOC will continue to engage in the cross-government response to climate change.

10.3. Economic/financial considerations

The proposed approach for each threat does not have any direct economic or fiscal implications given they are continuing with the status quo.

10.4. Submissions

Various submissions disagreed with the approach of managing all or some of these threats through existing management measures including the RMA and oil spill response planning.

Te Rūnanga o Ngāti Ruanui Trust noted risks from wind turbines and pollutants. Te Ohu Kaimoana noted other land-based diseases and pollution are not addressed and that a more holistic management approach is needed.

Some submissions sought specific activities (e.g. aquaculture, energy turbines, pollution, sedimentation, port infrastructure/activities, and other coastal development) to be addressed under the TMP. Other suggestions in submissions included managing and reducing erosion, sedimentation, underwater noise, plastics and pollution generally, and programmes around water quality, riparian fencing/planting and cat control.

Oil spill risk in Māui dolphin habitat featured in some submissions. Recommendations included removing the risk of oil spills, prohibiting further oil and gas drilling, and industry guarantees to protect marine wildlife.

Greater direction for RMA planning and consents was also recommended, including a national standard for underwater noise.

A common theme was more research on Hector's and Māui dolphins including on the impact of recreational vessels, aquaculture, forestry, disease and other pressures. Research on the smaller sub-populations of Hector's dolphin and the risk of further population fragmentation was also noted as a priority. Suggestions for research cut across all pressures, from fisheries and habitat modelling, to seismic surveying and seabed mining, to pollution, sedimentation and coastal development.

10.5. Comment

The descriptions provided in section 10.1 above are an accurate appraisal of each threat. Advice for managing these threats for Hector's and Māui dolphins are unchanged.

Some of the suggestions made in submissions were very broad; for example, proposals related to climate change and its effects, greenhouse gas emissions, removing oil and gas exploration and production from New Zealand, managing land-based effects, and so forth. While these all have implications for Hector's and Māui dolphins, they have far reaching government policy implications well beyond the management of these two subspecies. The Hector's and Māui dolphins TMP is not considered the appropriate tool for addressing these matters.

New Zealand's oil spill preparedness is in line with international best practice and as provided for in the Maritime Transport Act 1994.

Coastal developments (including aquaculture, wind and tidal turbines, and port infrastructure/activities), shipping, and pollution issues involve activities and effects that are highly variable depending on their type, location, intensity and spatial and temporal scale. Given this variability, a blanket approach is not considered practicable and effects on marine mammals (including Hector's and Māui dolphins) are better addressed through relevant RMA plans and consents.

The TMP has no statutory status and focusses on direct interventions for Hector's and Māui dolphin protection. Other suggestions around managing and reducing erosion, sedimentation, noise, plastics and pollution generally, and programmes for riparian planting and cat control, are much broader than the TMP. They are very important for many other environmental reasons. While these other broader issues are not individually addressed as direct actions in

the TMP, many are nevertheless a priority for DOC's advocacy, including under the RMA. The consultation document proposed DOC continues to engage in RMA processes to ensure effects on Hector's and Māui dolphins are appropriately avoided, remedied or mitigated.

Suggestions for greater national direction for Hector's and Māui dolphin protection through RMA plans and consents, including national standards for underwater noise and sedimentation, are noted. These are not simple suggestions and would require considerable policy work. Any future review of the New Zealand Coastal Policy Statement (NZCPS) could be used to strengthen policy around, for example, underwater noise, though it is also noted NZCPS Policy 11 already requires adverse effects of activities on Hector's and Māui dolphins to be avoided.

The consultation document included research objectives. Research is a critical part of ongoing management of Hector's and Māui dolphins and research planning will be an important next phase. Suggestions in submissions for improved research can be picked up at that time including through the proposed tangata whenua and stakeholder research advisory group.

10.6. Conclusion

No changes are recommended to how these other threats are directly managed.

11. ADDITIONAL ADVICE

The Minister of Conservation has sought advice on three additional fisheries-related matters:

- Extensions to fisheries measures off west coast of the South Island;
- Fisheries restrictions along the east coast of the North Island; and
- Prohibiting all recreational set netting in harbours in Banks Peninsula.

These proposals were not canvassed as part of the fisheries measures in the consultation document.

The consultation document proposed all fisheries controls through regulations under the Fisheries Act, in line with cabinet agreement on this matter. This approach simplifies management and avoids possible duplication and conflicts. The option of implementing fisheries restrictions through section 22 of the MMP Act is, however, a legal option.

The risk assessment estimated the current risk from set netting and trawling on the west coast of the South Island and the east coast of the North Island did not exceed the threshold for achieving the TMP's population outcomes for the dolphins. Thus, there is not the same scientific basis for additional fisheries restrictions in these locations as there is elsewhere around New Zealand.

Recreational set netting is prohibited offshore to four nautical miles along the east coast of the South Island from the Clarence River to South Point. However, recreational set netting is permitted:

- in estuaries, rivers, lagoons and inlets except for the Avon-Heathcote estuary;
- for flounder in the upper reaches of Pigeon Bay, Akaroa Harbour, Lyttelton Harbour and Port Levy (Banks Peninsula) between 1 April and 30 September.

Flounder set nets must be 9 meshes or less deep, have a monofilament diameter equal to or less than 0.35 mm, have a minimum mesh size of 100 mm, not exceed 60 m in total length, and be anchored at each end.

The 1 April and 30 September season aligns with when Hector's dolphins tend to be less common in harbours. Flounder nets should also pose less of a risk than other set nets because of their lower profile and use in shallower upper harbour areas. Nevertheless, there will be

some residual risk of set net captures in flounder nets in the upper harbours, as evidenced by a probable set net mortality reported in April 2015.

The Fisheries Act (Section 8) provides for the utilisation of fisheries resources while ensuring sustainability. Ensuring sustainability includes avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment. Section 15(2) of the Fisheries Act also provides for measures necessary to avoid, remedy, or mitigate the effect of fishing-related mortality on protected species, including setting a limit on fishing-related mortality. Thus, some Hector's dolphin mortality may not be inconsistent with the Fisheries Act.

A different position could be reached under the MMP Act given its very different purpose – *to make provision for the protection, conservation, and management of marine mammals within New Zealand and within New Zealand fisheries waters* (as set out in the Act's long title). Section 22(2) MMP Act includes a gazettal and public submissions process and requires consent from the Minister of Fisheries for any fisheries restrictions within a marine mammal sanctuary.

For consistency, these matters would be most appropriately addressed in the fisheries section of the Final Advice Paper.

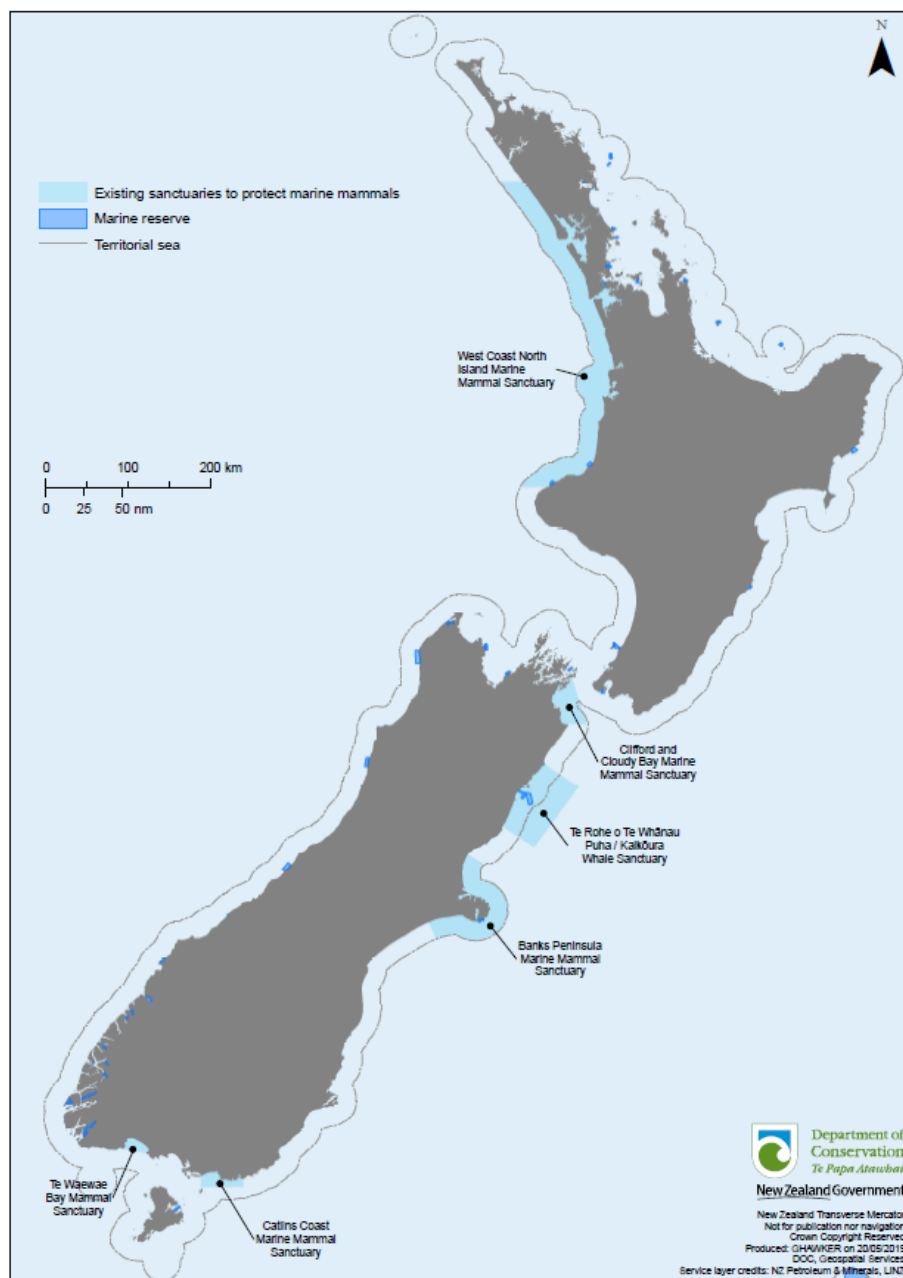


Figure 1: New Zealand mainland sanctuaries for protecting marine mammals.

Note: The Ōhau New Zealand Fur Seal Sanctuary is too small to be seen at this scale.

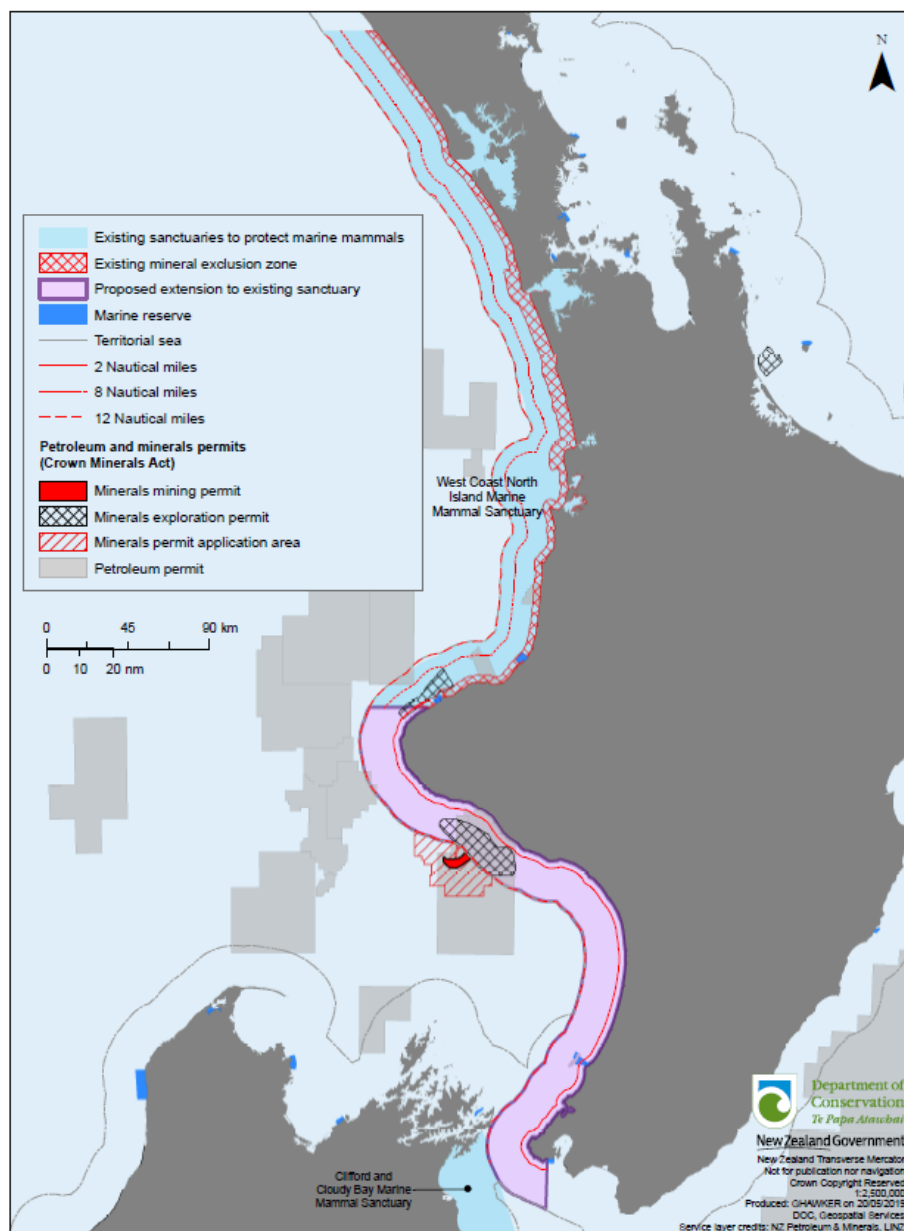


Figure 2: West Coast North Island Marine Mammal Sanctuary showing existing boundaries and proposed southern extension to the sanctuary.

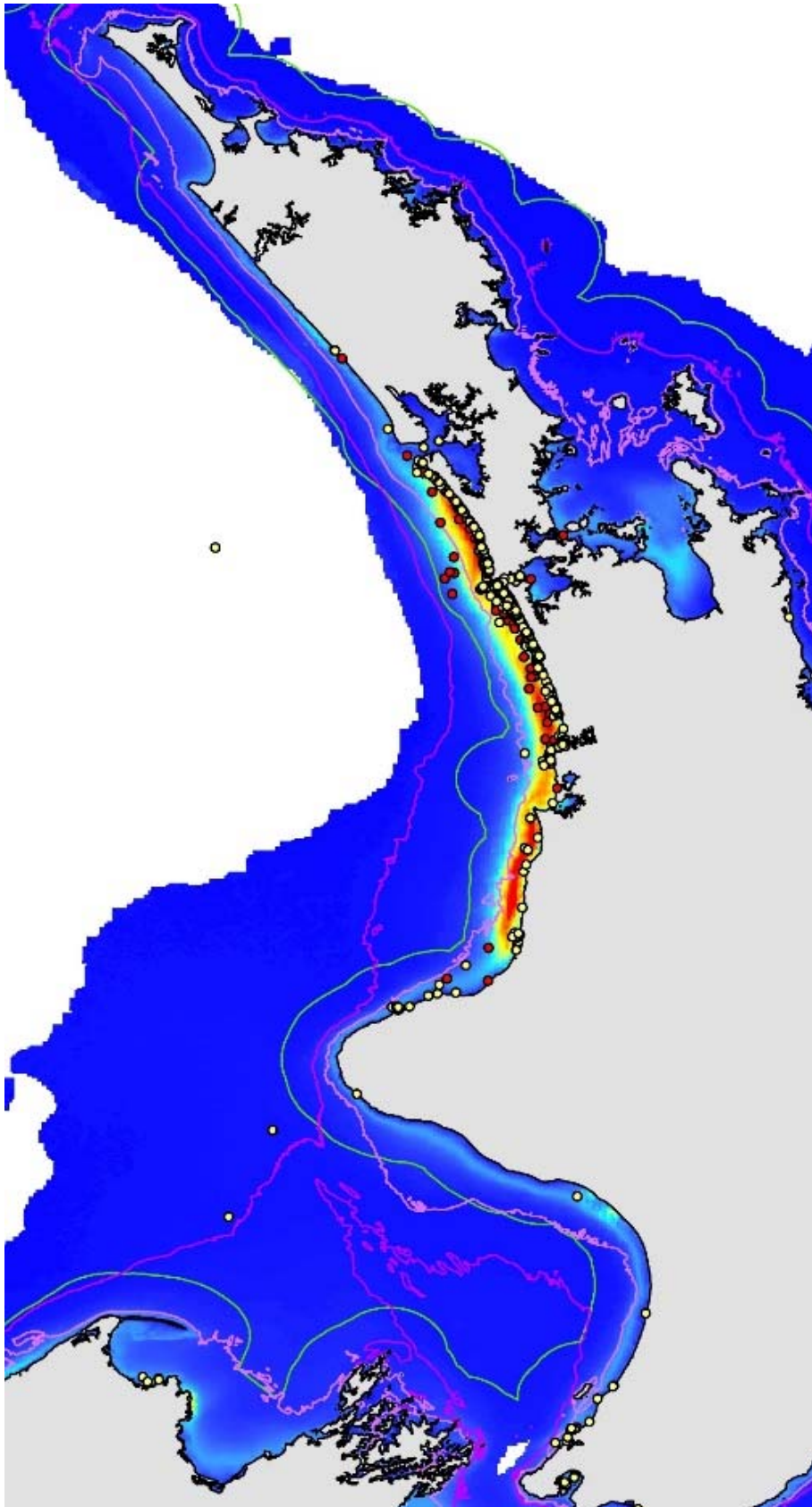


Figure 3: Estimated (winter) spatial distribution of Māui dolphins, including validated public sightings (yellow summer; red winter). Source – Spatial Risk Assessment.

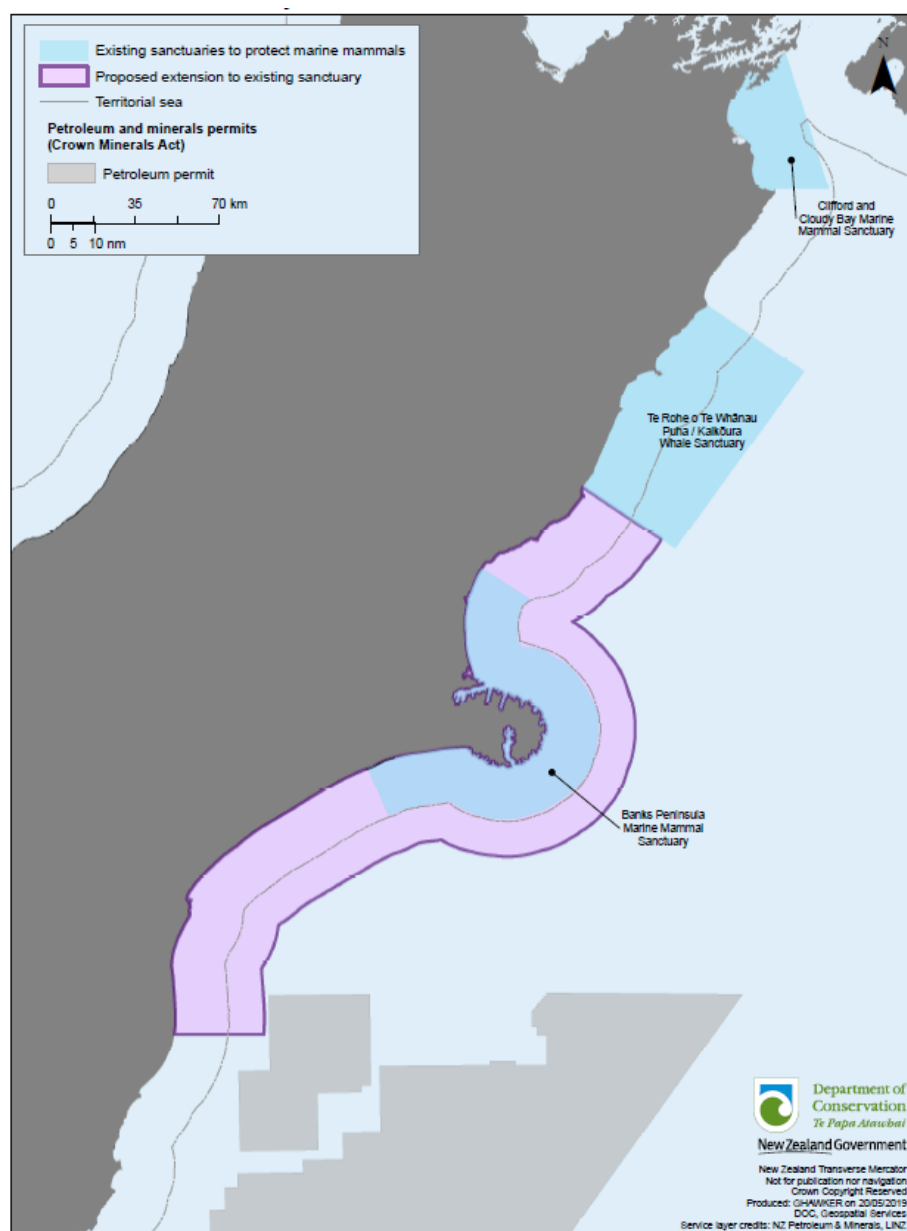


Figure 4: Banks Peninsula Marine Mammal Sanctuary showing existing boundaries and proposed extensions to the sanctuary.

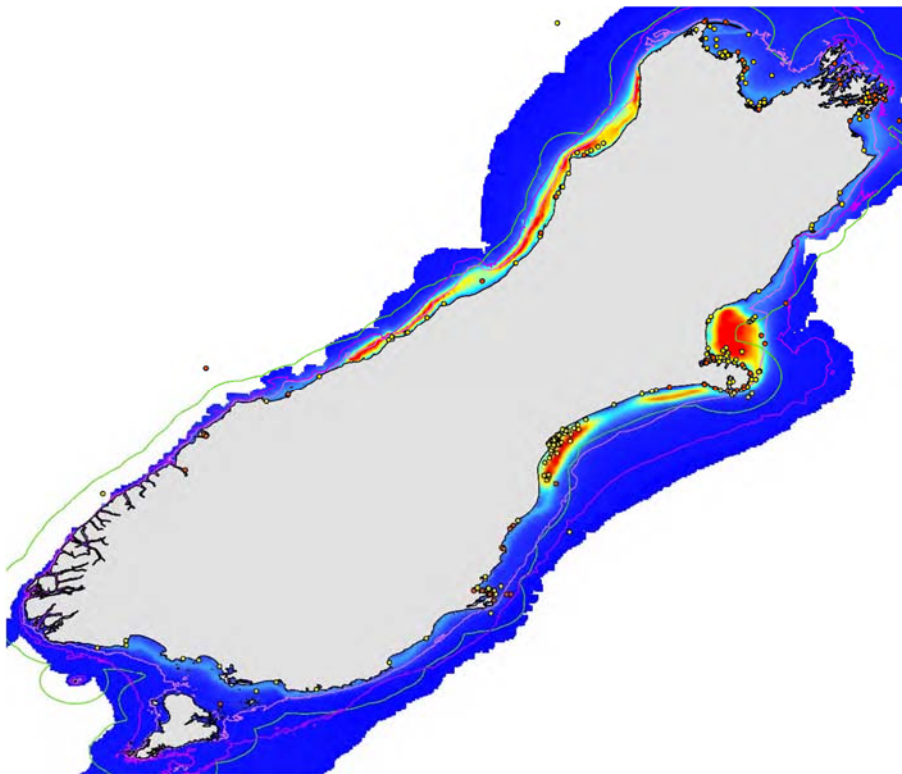


Figure 5: Estimated (winter) spatial distribution of Hector's dolphins, including validated public sightings (yellow summer; red winter). **Source – Spatial Risk Assessment.**