BEFORE THE MARLBOROUGH DISTRICT COUNCIL

U190438

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER **of an application to establish and operate a new salmon farm within a 1,000 ha site located approximately 5 km north of Cape Lambert**

STATEMENT OF EVIDENCE FOR
Professor Emeritus ELISABETH SLOOTEN

Qualifications and Experience

1. My name is Elisabeth Slooten. I am a Professor Emeritus at the University of Otago in Dunedin, where I have worked since 1990. I retired from my teaching position in the Department of Zoology in May 2021, and am continuing to carry out marine mammal research. I have undertaken extensive research on marine mammals in New Zealand waters since 1984, including research on Māui and Hector's dolphins, bottlenose dolphins, sperm whales and right whales.

2. I have been asked by the McGuinness Institute to provide scientific information and expert advice on the construction and operation of the proposed offshore salmon farm in relation to potential effects on marine mammals. I hold Bachelor of Science and Master of Science (first class honours) degrees in Zoology from Auckland University, and a PhD in Zoology from Canterbury University.

3. My research includes population surveys to study the population size and distribution of marine mammals, estimation of survival and reproductive rates, behavioural research, population viability analyses, and risk analyses to quantify the impact of fishing, aquaculture, tourism and other human activities on marine mammals. The population survey work includes boat surveys, aerial surveys using planes, helicopters and drones, acoustic surveys using towed hydrophone arrays, directional hydrophones, and passive acoustic data loggers. I was invited to join an overseas, large-vessel, whale and dolphin survey in order to train scientists from the United States National Marine Fisheries Service (NMFS) in the use of some of these techniques in 1995.

4. I have published two books, more than 100 peer-reviewed papers in scientific journals, chapters in scientific books, encyclopedia chapters, and over 50 invited or contracted reports and papers on marine mammals.

5. I am the co-director of the Otago University Marine Mammal Research Group. Other researchers in this group also directly involved in research on Māui and Hector's dolphin include Dr Steve Dawson (Emeritus Professor in Marine Science Department at Otago University), Dr William Rayment (Senior Lecturer in Marine Science Department at Otago University) and a team of graduate students (10-15 MSc and PhD students at any one time). Together, our team has more than 80 years of research experience plus almost 60 years of student research on marine mammals. This summer, I will be carrying out research on Hector's and Māui dolphins with Professor Dawson, Dr Rayment, 3 PhD students and 2 MSc students.

6. I was awarded the Sir Charles Fleming Award for outstanding contribution to environmental science in 2004, by the Royal Society of New Zealand. This award is made once every three years and was awarded to me jointly with Professor Stephen Dawson.

7. I was awarded the Professor John Morton Award for outstanding contribution to marine science in 2016 by the New Zealand Marine Sciences Society.

8. I have been a member of the Scientific Committee of the International Whaling Commission (IWC) since 1992 and a member of the Cetacean Specialist Group of the International Union for Conservation of Nature (IUCN) since 1991. I am regularly invited to examine PhD and MSc theses from New Zealand and overseas universities, invited to participate in national and international conferences and workshops about marine mammal science and threats to marine mammal populations, and invited to referee scientific publications in international scientific journals. I am a member of the Council of the New Zealand Marine Sciences Society and have been its Secretary, Vice President and President in previous years. I am regularly commissioned by government departments and commercial clients to carry out research on the potential impacts of human activities on marine mammals. I chaired the organising committee for a major international conference of the Society for Marine Mammalogy, held at Otago University in 2013.

9. I have taught graduate and undergraduate courses at Otago University on marine mammals and other marine vertebrates, biology, ecology, population viability analysis and statistics. I have supervised more than 55 graduate student projects, including 20 PhD projects. My role at the University of Otago has included setting up and being the Director of a post-graduate programme in Environmental Science.

10. For the purposes of this assessment I have considered the marine mammal assessment that was submitted with the application (Clement and Elvines 2019), the statement of evidence by Deanna Clement dated 30 September 2021, and the statement of evidence of Helen McConnell dated 24 September 2021. I have relied on their descriptions of the proposal, augmented by the statement of evidence by Mark Preece dated 1 October 2021.

11. Though this is not an Environment Court hearing I have read the Environment Court's Code of Conduct for Expert Witnesses 2014, and I agree to comply with it. I confirm that the issues addressed in this statement are within my area of expertise, except where I state I am relying on information from others. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

The structure and operation of the proposed offshore salmon farm

12. The specific structure and operation of the proposed farm appear to have evolved over the course of the application. For example, Figure 2 in Clement and Elvines (2019) showed a drawing of a 'Fortress' pen, which are produced by Huon Aquaculture. This pen includes an outer 'predator exclusion' net, surrounding the net holding the salmon. However, Clement's (2021) description of net systems indicates that outer predator nets will not be used in the foreseeable future.

13. A clear description of the pros and cons of using predator exclusion nets would be very useful. Using a predator exclusion net around the entire farm would reduce the probability of seals getting into the farm, biting holes in the salmon nets and allowing dolphins and other marine mammals to enter the farm. Dolphins have in the past been caught between the salmon net and predator net. However, the reports I've seen indicate that dolphins have also been found dead in the salmon net itself.

14. Likewise, more clarity would be useful in regard of the oversight of the operation. For example, Clement (2021) states that "Each barge will be able to be operated by a combination of: (a) By persons living and working on the barge" and "(b) Remotely, by a set of cameras and other monitoring equipment that would enable Blue Endeavour to be managed either from another farm or from a shore base." Clement's paragraph 33 states that "The barge may be staffed when weather conditions permit, and operated remotely during

adverse weather (ie. Where it is either unsafe or uncomfortable for staff to be onsite).” This will directly affect how closely the proposed operation would be supervised, which is critical for detection of marine mammals becoming entangled in the farm structures and having any chance of preventing marine mammal deaths due to entanglement.

Potential impacts of the proposed offshore salmon farm on marine mammals

15. The risks associated with the proposed salmon farm are highly uncertain, without much more scientific evidence. At this time there is no scientific basis for judging the effects on marine mammals and other protected species as “no more than minor”. Scientifically-robust experimental data from similar offshore marine farms overseas would seem essential to the Marlborough District Council in evaluating this resource consent application. The Council would be in a position to take a rational, science-based decision when data from a similar farm, in an area without endangered marine life are made available. For example, observations from US or EU waters, where a similar operation has been observed in an area with relatively common species like common dolphin and bottlenose dolphins. New Zealand has a large number of marine mammal species, with several endemics. International organisations, such as the Global Salmon Initiative that NZKS belongs to, are no doubt working on such research. There is also a considerable amount of scientific literature which could have been made much better use of in the application.

16. Overseas research indicates that aquaculture operations placed in areas with marine mammal populations invariably involve impacts on marine mammals. These impacts include occupying habitat previously used by marine mammals and entanglement of marine mammals in farm structures (e.g. Kemper et al. 2003).

17. The list of marine mammal species in the area of interest, in the text and maps in Clement (2021), includes:

a. Hector's / Maui dolphins
b. Common dolphins
c. Bottlenose dolphins
d. Dusky dolphins
e. Orca
f. Pilot whales
g. Right whales
h. Humpback whales
i. Blue whales
j. Bryde's whales
k. Fin whales
l. Minke whales
m. Sei whales
n. Several beaked whale species
o. Fur seals

18. As acknowledged by Clement and Elvines (2019) and Clement (2021), most of these marine mammal sightings are public sightings. Such anecdotal information is not suitable for assessing the potential impacts of an application of this kind. As acknowledged in the applicant's reports, the distribution of the marine mammal sightings is influenced by the distribution of human use of the area. This anecdotal information is unable to provide a clear indication of the actual distribution of marine mammals in the area. The location and seasonality of sightings are driven by the location and seasonality of human use of the area. In addition, some of the species identifications in these public sightings may not be accurate. Most members of public

are able to identify the most common species encountered. Less common species, such as beaked whales are likely to be reported as pilot whales or not reported at all.

19. A list of species is inadequate for detecting impacts of the proposed structure on marine mammals. Only extreme impacts (e.g. an entire marine mammal species disappearing from the area) would be detectable with such poor information. At a minimum, data on the number of individuals of the key marine mammal species in the area should be gathered. Seasonal information is also important in order to determine if the farm, if it goes ahead, causes population declines or movement of marine mammals away from the area of the farm.
20. The Ministry for Primary Industries' risk analysis for Maui and Hector's dolphins (Roberts et al. 2019) states that: "The greatest degree of overlap when scaling for population size, was estimated for the NCSI, indicating that the highest encounter rate per dolphin between Hector's dolphins and aquaculture facilities would occur in this area relative to other sub-populations (although note that the spatial extent of this overlap is still small) (Table 14, Figure 19)." The abbreviation NCSI means North Coast of South Island. Roberts et al.'s (2019) Figure 19 is reprinted below, as Figure 1 of my evidence. The fact that this MPI report said that the overlap between aquaculture and Hector's / Maui dolphins is "still small" indicates that the risk is already highest on the north coast of the South Island, and would increase further if the Council grants this consent and the overall area in aquaculture is increased.
21. Dolphin protection in the area has evolved over time (Figure 2). Currently, the area of the proposed farm is not a protected area for Hector's or Maui dolphin. However, given the continued population decline of Maui dolphin and the lack of recovery of Hector's dolphin, it is likely that additional protection will include the area of the proposed salmon farm. From a biological point of view, it does not make sense to

build an offshore marine farm in an area that connects several very small population of Hector's and Maui dolphins.

22. Current protection extends along the North Island west coast to Wellington (Figure 2). MPI estimate there are 15 Maui dolphins between Cape Egmont and Wellington in summer and 17 in winter (Roberts et al. 2019). Protection for the Tasman Bay – Golden Bay population of Hector's dolphins stops just south of d'Urville Island and therefore excludes the proposed farm site. Likewise, a Marine Mammal Sanctuary provides partial protection for Hector's dolphins in Cloudy Bay – Clifford Bay but does not include the proposed farm site. The genetics of Hector's / Maui dolphins of the north coast of the South Island is not sufficiently well understood to know if the dolphins in the vicinity of the proposed salmon farm are Hector's or Maui dolphins.
23. Right whales and humpback whales are both slowly recovering and well-known to become entangled in ropes, lines and other human-made structures in their environment (e.g. NOAA 2021). An increase in population size will increase the potential for whale entanglements. Likewise, any increase in the placement of human-made structures in the migration path of right whales and humpback whales increases the risk of whale injuries and deaths due to entanglement. I agree with Clement and Elvines (2019) that right whales and humpback whales are both likely to encounter an offshore marine farm in the area proposed.
24. I disagree strongly with the statement in Clement (2021) that that "we have a good understanding of the various marine mammal species that travel and use the outer Sounds and a wider Cook Strait waters". Likewise, there is no evidence available at this time to determine the importance of the area of the proposed farm for marine mammals, compared to other parts of Cook Strait. A properly designed, scientific survey would need to be carried out in order to obtain an accurate picture of marine

mammal distribution in the area, including the species present and the number of individuals present. This would allow future surveys to test for impacts from the proposed salmon farm. Given the lack of scientific surveys in the area, there is no reason to believe that this list of marine mammal species is complete. More importantly, the number of individuals of each species using the area is unknown.

25. Baseline, 'before' data on marine mammals would need to include, at a minimum, population size and seasonal use of the area. For example, humpback and right whales migrate through the area. Therefore, the number of right whales potentially encountering the proposed offshore salmon farm per day would be very different from the number of right whales potentially encountering the proposed farm over the course of a year. This information is essential, to allow the Council to evaluate the potential impacts of the proposed salmon farm. It is also essential, if the farm goes ahead, to compare 'impact' conditions with 'before impact' conditions.
26. Some of these species are endemic and endangered. In those cases, the death or injury of a small number of individuals would incur a high conservation cost. It is my understanding that the NZCPS requires avoidance of *any* effects on threatened and at risk species, for which removing a single individual could have regional or population-level effects. New evidence indicates that Hector's dolphins are displaced from areas of mussel farming (Valdes 2021) and the closely related Chilean dolphin is displaced from areas of salmon farming (Heinrich et al. 2018).
27. Another essential piece of information, to inform the Council in its decision whether to grant or decline the resource consent would be data from similar overseas offshore aquaculture operations. For example, Australian salmon farms have had regular impacts on marine mammals (Kemper et al. 2003). Most impacts of marine farming operate via multiple indirect and potentially synergistic pathways such as exclusion

from important habitat, habitat degradation, food web alterations, noise pollution, contamination and spread of disease (Buschmann et al. 2006; Kemper et al. 2003; Markowitz et al. 2004; Pearson et al. 2012; Ribeiro et al. 2007; Watson-Capps & Mann 2005). Fish farms can also affect dolphin habitat use patterns (Bonizzoni et al. 2013), because farmed fish or cage-associated wild fish can act as attractive food sources (Piroddi et al. 2011).

28. In summary, the applicant has failed to provide sufficient information on marine mammals to allow the Council to assess the potential impact of the farm on marine mammals. This would require a 'before and after' or 'control vs impact' study on a similar development overseas (in an area without endemic, endangered species of marine mammals). A desktop exercise, using mostly anecdotal information, is inadequate to allow the council to make an informed, science-based decision.

Insufficient data on impacts provided by applicant

29. Marine mammals are well known to prey on fish from fish farms and to be injured or killed as a result of entanglement in the farm structures (e.g. Oporto et al. 1991; Pemberton and Shaughnessy 1993; Sepulveda 1998; Schotte and Pemberton 2002). Attempts to solve this problem have had a very low success rate (e.g. Kemper et al. 2003). Australian fur seals tend to attack fish cages at night, breaking holes in the nets. Most of these holes are less than 200 mm in diameter. Nets of 4 mm braided polythene and steel mesh were not damaged by seals (Kemper et al. 2003). New Zealand fur seals are known to climb over anti-predator fences if these extend less than 1.5 m above sea level.
30. Entanglements in fish farms reported in the scientific literature include Australian sea lions, South American sea lions, South American fur seals, New Zealand fur seals,

Australian fur seals, elephant seals, leopard seals, common dolphins, bottlenose dolphins, dusky dolphins, Chilean dolphin, Peale's dolphins, minke whales, Bryde's whales and humpback whales (Kemper et al. 2003). Most of these entanglements are fatal. Acoustic harassment devices, underwater explosives, electric fencing, chasing with boats, frightening with bright lights, anti-predator nets, trapping and relocation have all been attempted but with little success in the long term (Pemberton 1989; Pemberton and Shaughnessy 1993; Schotte and Pemberton 2002; Kemper et al. 2003). For example, one individual seal was trapped 43 times in four years (Hume et al. 2002; Kemper et al. 2003). This is not surprising, as the fish in the fish farms are a very strong food reward. Some of the attempts at mitigation may in fact be ringing the 'dinner bell' for marine predators.

31. The applicant's reports include qualitative judgments on whether the risk of entanglement of marine mammals in farm structures is "less than minor" or "negligible". However, a scientifically robust assessment, based on quantitative data on the number of entanglements in New Zealand marine farms and offshore marine farms in other parts of the world was not included in the application. On the basis of the information currently available, I cannot agree with Clement (2021) that entanglement and other impacts of marine farms in New Zealand are "minor". The lower number of reported entanglements, compared to other countries, appears to be at least partly due to a low level of reporting and poor record keeping in New Zealand.
32. Table 1, at the end of this report, lists 29 known marine mammal entanglements in New Zealand marine farms of which only 10 are included in the Table in Appendix 2 of Clement and Elvines (2019). I did not find an update of Appendix 2 in Clement (2021). The fact that the entanglement information included in Clement and Elvines

(2019) is incomplete, calls into question their qualitative judgments about the risk of entanglement. Although it includes three times as many entanglements, Table 1 below may still under-estimate the actual number of entanglements.

33. Data on marine mammal injuries and deaths in marine farms are available from several sources, including the Department of Conservation marine mammal incident database, reports by New Zealand to the International Whaling Commission and reports for previous hearings (e.g. Cawthorn 2016). Inconsistencies among these different data sources indicate that a rigorous system for reporting marine mammal injuries and mortalities in marine farms is not currently in place and/or that there are problems with record keeping. The inconsistencies among the different sources of information undermine confidence that future marine mammal injuries and mortalities, in the proposed offshore marine farm and other such operations, will be accurately reported – to government agencies or to the public at large.
34. A robust system for open, transparent reporting of marine mammal injuries and deaths in marine farms would help agencies like the Marlborough District Council to properly evaluate the likely environmental impacts of proposed marine farms. It would also provide confidence that the environmental impacts of the proposed offshore salmon farm, if it is approved, will be carefully monitored and reported on.
35. Research from Chile shows a similar pattern, with 'official' records substantially under-estimating marine mammal entanglement in salmon farms, because these entanglements are under-reported. For example, Espinoso-Miranda et al. (2020) report six separate entanglements of Chilean dolphins in salmon farms. Two were documented in official government records, and the other four in the scientific literature or interviews with salmon farm staff.

36. The location of the proposed offshore farm will place it into the environment of many additional marine mammal species, compared to marine farms in enclosed waters – including the migration route of several whale species. Therefore, even if robust data were available on the impact of existing farms on marine mammals this would not provide a full picture of what might happen in the case of an offshore farm. I agree with Clement (2021) that "the potential injury or death to a threatened or endangered species warrants additional mitigation measures to help reduce any risk to as close to zero as possible". However, it is not at all clear how this could be achieved.
37. No evidence is provided to demonstrate that the actions proposed in the Marine Mammal Action Plan (Clement 2021) are actually effective in reducing impacts. Again, what's needed is published information from similar operations overseas. The Council needs hard data on the impacts on marine mammals, and hard data on testing mitigation measures to determine if they work or not. An 'adaptive management' approach would be inappropriate without hard information on the effectiveness of the proposed mitigation measures. Irreversible harm could be caused before such harm is detected. For example, removing a small number of individuals from a slowly recovering marine mammal population could substantially reduce the rate of recovery, or cause population declines. Given the already dire situation for Maui dolphins, and several small populations of Hector's dolphin, any additional removals – on top of existing impacts – could mean extinction (for Maui dolphins) or extirpation for important 'bridging' populations of Hector's dolphins (e.g. north coast of South Island).
38. The net specifications in the Marine Mammal and Shark Management Plan attached to Clement (2021) mention "Marine predator exclusion nets (where used)" must have a maximum mesh size of "200mm". It sounds like the use of predator nets has been

abandoned at this time. However, this is a much larger mesh size than recommended by Kemper et al. (2003).

39. Aquaculture has the potential to impact marine mammals through direct and indirect effects (e.g. Würsig and Gailey 2002; Kemper et al. 2003; Markowitz et al. 2004). Direct effects include displacement from important habitat, disruption of migration pathways and death or injury through entanglement (e.g. Espinosa-Miranda et al. 2020; Watson-Capps & Mann 2005). Indirect effects include changes in the abundance and availability of prey species, and increase in environmental contamination (with pesticides, fungicides, anti-fouling paint, antibiotics, among others; Heinrich, 2006). For example, Chilean salmon farming has resulted in significant loss of benthic biodiversity and changes in the physico-chemical properties of sediments (Buschmann et al. 2006).
40. I agree with Clement (2021) that the significance of "'disruptions' to their foraging and feeding success is currently unknown, and may range from less than minor (i.e. discernible effect but too small to affect more than a few individual animals) to more than minor implications (i.e. the loss of a primary food source begins to have population-level effects, such as reduced reproduction rates)." As stated, impacts of salmon farms on foraging and feeding success of marine mammals is "currently unknown". Placing a salmon farm in open water will ensure more 'flushing' of sedimentation (excess food and salmon faeces), which in enclosed waters can cause impacts on the environment and the salmon farm itself. However, in an offshore farm the same amount of sedimentation is spread in a thinner layer over a much larger area. Sensitive organisms like sponges do not cope well with even very fine sediment. Additional ecological impacts from salmon escaping into the New Zealand marine environment, and pollutants found in imported salmon feed, will also be spread over a

larger area in the case of an offshore farm. For example, the average number of farmed salmon escaping into Chilean waters has been estimated at more than 4 million individuals each year, able to consume more than 6000 tonnes of pelagic prey from local ecosystems (Niklitschek et al. 2012).

41. Research has shown that bottlenose dolphins can be attracted to fish farms by local enhancement of prey species (Díaz et al. 2005). Fish farming has been shown to result in direct mortality of bottlenose dolphins through entanglement in predator exclusion nets (Díaz & Bernal 2008 also see Table 1 below) and may also affect their social structure and behaviour (Díaz & Bernal 2008).
42. Chilean dolphins showed avoidance of areas with high mussel farm coverage (Ribeiro et al. 2007), and bottlenose dolphins decreased their use of an area in Shark Bay, Australia, after an oyster farm was established (Watson-Capps & Mann 2005). In New Zealand, research on dusky dolphins indicated that they rarely use areas occupied by mussel farms in Admiralty Bay, and that mussel farms hinder cooperative feeding by dusky dolphins (Pearson et al. 2012). Furthermore, the number of dusky dolphins in the area appears to be declining (Pearson et al. 2012).
43. Ecosystem effects of aquaculture can also result in significant impacts on dolphin populations. Aquaculture affects the physical and chemical properties of the benthos and water column, causing not only changes in nutrient fluxes but also impacting productivity, and consequently potentially influencing higher trophic levels (Valdes 2021).
44. Slooten et al. (2001) observed Hector's dolphins around a mussel farm in Golden Bay, and recommended further research to be conducted on this topic before any further expansion of mussel farming into dolphin habitat was considered. Soon after, Lloyd (2003) prepared a report for the Department of Conservation which included

potential effects of aquaculture on marine mammals in New Zealand. After gathering information from New Zealand and other parts of the world, Lloyd (2003) concluded that "there are reasonable grounds to believe that, mussel cultivation has adverse effects on marine mammal and seabird populations in New Zealand".

45. Aquaculture can affect marine ecosystems, habitats and biodiversity (Dosdat, 2009) altering species richness and ecosystem functioning (Machias et al. 2004; Edgar et al. 2010). Aquaculture impacts the benthos (e.g., Kaiser et al. 1998; Inglis & Gust 2003; Kalantzi & Karakassis 2006; Hartstein & Rowden 2008), the water column (Sarà 2007) and broader ecosystem (e.g. Gibbs 2004; McKindsey et al. 2006; Díaz López & Bernal 2008; Dempster et al. 2009, 2010; Bonizzoni et al. 2013).
46. Research on the impact of mussel farming on Hector's dolphins at Banks Peninsula shows that bays with mussel farms had significantly higher numbers of Hector's dolphin sightings before the farms were established (Valdes 2021). This could indicate that farm structures cause displacement by restricting space and therefore disrupting biological and social activities (Würsig & Gailey 2002; Kemper et al. 2003; Markowitz et al. 2004; Ribeiro et al. 2007; Pearson 2009; Pearson et al. 2012). Additionally, farm structures may affect the dolphins' ability to detect and capture prey (Würsig & Gailey 2002; Kemper et al. 2003; Pearson 2009; Pearson et al. 2012). Lines, buoys and blocks may also affect the free movement of fish (Würsig & Gailey 2002). Disturbance associated with farm operations, vessel traffic and noise could be a factor (Richardson et al. 1995; Würsig & Gailey 2002; Ribeiro et al. 2005). Certainly, vessel traffic can affect marine mammal swimming speed and direction (e.g. Kruse 1991; Nowacek et al. 2001; Ribeiro et al. 2005; Lundquist 2007; Marley et al. 2017), group cohesion (e.g. Blane and Jaakson 1994; Bejder et al. 1999; Ribeiro et al. 2005; Bejder et al. 2006), behaviour (e.g. Aguilar Soto et al. 2006) and habitat

use (e.g. Bejder et al. 1999, 2006; Courbis and Timmel 2009). Noise from the vessels associated with the farms' activities can cause stress (e.g. Simmonds et al. 2004; Wright et al. 2007; Luís et al. 2014), impact the dolphins' hearing, and/or mask sounds from other dolphins making it difficult to communicate (Marley et al. 2017).

47. Impacts on dolphins may have flow-on ecological effects on other species. As predators, marine mammals have an important role in maintaining ecosystem stability and function (e.g. Estes et al. 2016). Marine mammals have direct and indirect effects on species interactions and community structure, and have been shown to enhance primary productivity with their faeces, releasing nitrogen near the surface where it is made available for primary producers (Roman et al. 2010; Lavery et al. 2014; Roman et al. 2016). Moreover, research in other parts of the world has shown that their faeces and vomit can be a food source to fishes (Sazima et al. 2003).
48. Aquaculture in New Zealand is mainly managed under the Resource Management Act 1991 (RMA), followed by the Resource Management (National Environmental Standards for Marine Aquaculture) Regulations 2020 aimed to promote sustainable management of natural resources. The RMA (1991) stated that "no person may, in the coastal marine area destroy, damage, or disturb any foreshore or seabed (other than for the purpose of lawfully harvesting any plant or animal) in a manner that has or is likely to have an adverse effect on plants or animals or their habitat". However, what constitutes an "adverse effect" is not specified. Further, the Resource Management (NESMA) Regulations 2020 defined a significant marine ecological area as "an ecosystem, a vegetation type, or the habitat of an indigenous species that has been identified as significant". Under this definition, the habitat of Hector's and Maui dolphins is clearly the habitat of a significant indigenous species.

49. A thorough consideration of the potential impacts of the proposed offshore salmon farm is warranted. The application fails to provide scientifically robust data on: 1) The marine mammal species in the area of the proposed marine farm, 2) The numbers of individuals and likely encounter rates of these marine mammals with the proposed marine farm, 3) The likely impacts on marine mammals, including a comprehensive record of past entanglements, 4) Evidence that the mitigation measures proposed are effective. As I have outlined, there is a wealth of additional information available to draw on, including New Zealand and international scientific literature, government databases and other information. In addition, some specific, properly-designed scientific investigation is required on the marine mammals in the area and the likely impacts of the proposed marine farm on their populations.

Date	Species	Type of farm	Area
1 October 1987	Common dolphin	Salmon farm	Marlborough
26 December 1987	Hector's dolphin	Salmon farm	Akaroa
7 May 1996	Bryde's whale	Mussel farm	Great Barrier Island
1999	Dusky dolphin	Salmon farm	Marlborough
1999	Dusky dolphin	Salmon farm	Marlborough
29 November 2003	Bryde's whale	Mussel farm	Great Barrier Island
17 February 2005	Hector's dolphin	Salmon farm	Marlborough
2010	Bottlenose dolphin	Salmon farm	Marlborough
24 August 2011	Bottlenose dolphin	Salmon farm	Marlborough
29 August 2011	Dusky dolphin	Salmon farm	Marlborough
14 June 2012	Dusky dolphin	Salmon farm	Marlborough
3 July 2013	Fur seal	Salmon farm	Marlborough
2014	Fur seals*	Salmon farm	Marlborough
1 July 2015	Dolphin	Salmon farm	Marlborough
2015	Fur seals**	Salmon farm	Marlborough
2016	Fur seals***	Salmon farm	Marlborough
22 January 2018	Whale	Mussel farm	Marlborough
23 January 2018	Whale	Mussel farm	Marlborough
21 September 2018	Dusky dolphin	Salmon farm	Marlborough
1 November 2018	Dusky dolphin	Salmon farm	Marlborough
21 November 2018	Dusky dolphin	Salmon farm	Marlborough
21 November 2018	Dolphin	Salmon farm	Marlborough
31 January 2019	Fur seal	Salmon farm	Marlborough
1 March 2019	Fur seal	Salmon farm	Marlborough
3 July 2019	Common dolphin	Salmon farm	Marlborough
3 February 2020	Fur seal	Salmon farm	Marlborough
11 March 2020	Fur seal	Salmon farm	Marlborough
30 April 2020	Fur seal	Salmon farm	Marlborough
29 September 2020	Fur seal	Salmon farm	Marlborough

Table 1. Records of known marine mammal entanglements, including records in DOC databases, reported by New Zealand to the International Whaling Commission and reported by NZKS to Martin Cawthorn (e.g. 2014-2016) and by NZKS online (2019 and 2020). *In 2014, there was 1 death and 14 ‘incidents’ involving 20 seals. **In 2015, there were 2 deaths, 65 ‘incidents’ involving 85 seals. ***In 2016 there was 1 death and 113 ‘incidents’ involving 208 seals.

Figure A11-4: Aquaculture estimated spatial threat intensity (current operations only)

Figure 1. Map of aquaculture impact on Hector's and Maui dolphins, included in Roberts et al. (2019) as their Figure A11-4. Note that this does not include the proposal for offshore salmon farming, currently being considered by the Marlborough District Council.

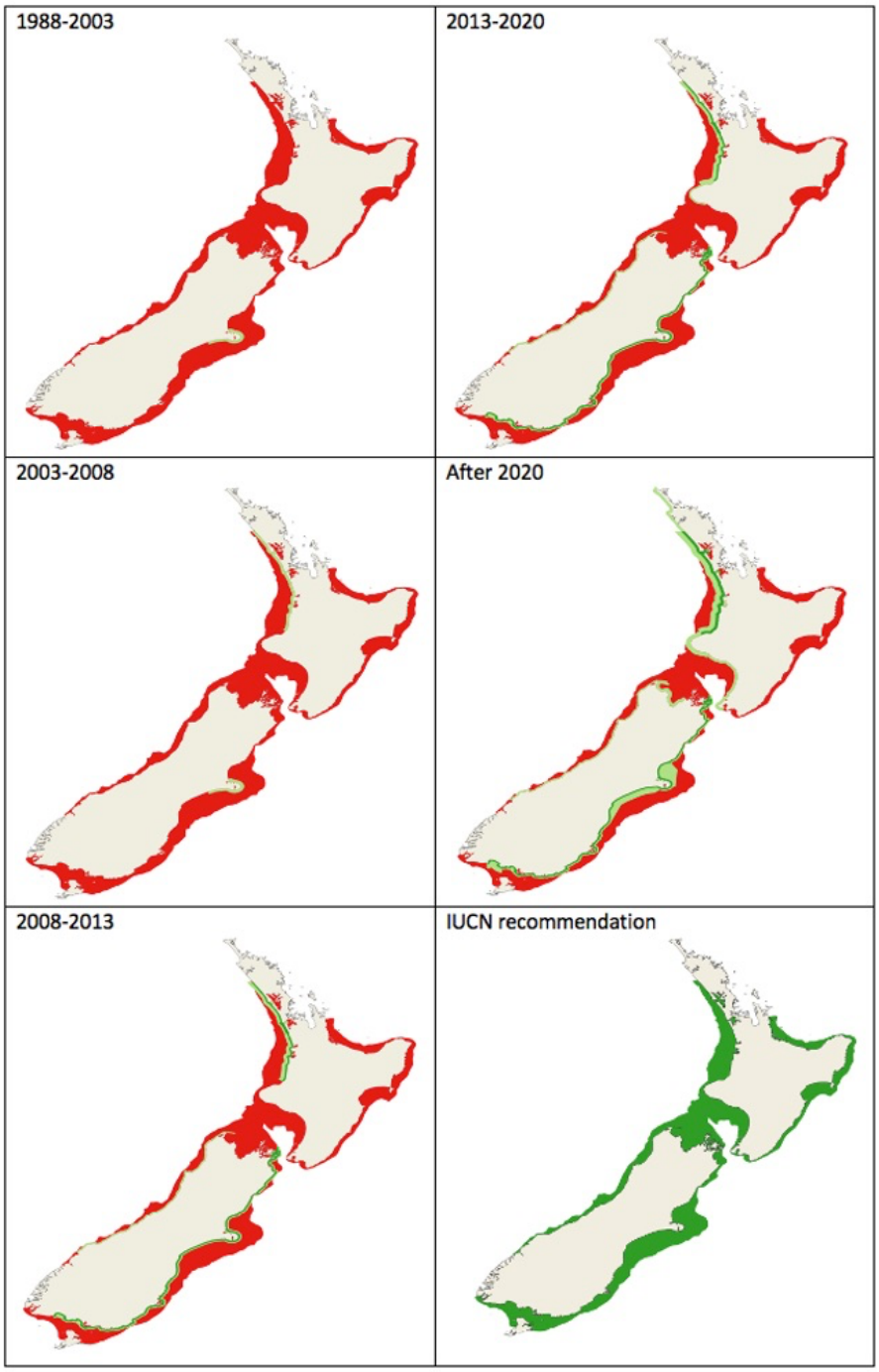

Figure 2. History of dolphin protection. Red: Range of Hector's and Maui dolphins, Dark green: Protection from gillnet and trawl fisheries, Light green: Protection from gillnet fisheries only.

References

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