

**BEFORE THE OTAGO REGIONAL COUNCIL
AT DUNEDIN**

Under the

Resource Management Act 1991

In the Matter of

Proposed Otago Regional
Council's Draft Regional Policy
Statement

**STATEMENT OF EVIDENCE OF ELISABETH SLOOTEN IN SUPPORT OF
SUBMISSIONS BY THE WISE RESPONSE SOCIETY INC.**

BACKGROUND

1. My full name is Elisabeth Slooten.
2. I am a Professor in Zoology at the University of Otago, where I have worked since 1990.
3. I have published more than a hundred peer-reviewed articles in refereed international and national science journals and written more than 50 reports for companies, government and non-government agencies. I have previously been a scientific expert at Regional Council, Environment Court and Environmental Protection Agency Hearings.
4. My research interests include reproductive biology, population biology, population viability analysis, marine conservation, marine mammal biology, conservation and risk analysis.
5. 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.
6. I have represented New Zealand on the Scientific Committee of the International Whaling Commission (since 1992) and am a member of the Cetacean Specialist Group of the IUCN (since 1991). I am regularly invited to examine PhD 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 a range of New Zealand and international scientific journals. I have been the Secretary and President of the New Zealand Marine Sciences Society. I am regularly commissioned by government departments and commercial clients to prepare reports 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.
7. I teach graduate and undergraduate courses at Otago University on the biology of marine mammals, marine vertebrates, marine conservation biology, ecology, population viability analysis and statistics. My role at the University of Otago has included setting up and being the Director of a graduate programme in Environmental Science.
8. I am familiar with marine environments around New Zealand, including Otago, the dynamic character of marine ecosystems, approaches for evaluating change and the range of threats driving marine biodiversity loss.

9. My comments are based on my research and understanding of the relevant scientific literature for Otago, nationally and internationally.
10. I have previously provided expert evidence at Regional Council Hearings, Environment Court Hearings, and EPA hearing and other Expert Panels and Advisory Panels.
11. I have read the Code of Conduct for Expert Witnesses, and agree to comply with it.
12. I confirm that the issues addressed in this brief of evidence are within my area of expertise.

RISKS AND VULNERABILITIES TO OTAGO'S MARINE ECOLOGY

Global Context

13. Globally, ocean temperature and acidity are increasing (IPCC 2007). Ocean acidification makes it more difficult for marine organisms such as shellfish, shrimps and corals to form shells, exoskeletons and other support structures through calcification. Most of these organisms form the base of complex marine food webs. For example, many organisms in the zooplankton have calcium shells. Therefore, ocean acidification has wide ranging implications for the entire marine ecosystem.
14. The distribution, productivity and species composition of global fish populations is starting to change (FAO 2008) with complex impacts on oceans, estuaries, coral reefs, mangroves and sea grass beds that provide habitats and nursery areas for fish (Brander 2007). These environmental changes have the potential to impact the sustainability of fisheries and aquaculture, the livelihoods of the communities that depend on fisheries and the ability of the oceans to capture and store carbon. In addition, changing rainfall patterns, land use patterns and water scarcity are impacting on rivers and lakes with flow-on effects for coastal marine environments.
15. Coastal marine ecosystems are already heavily impacted by a range of human activities. The direct and indirect effects of fishing have resulted in substantial changes in marine ecosystems (e.g. Pauly et al. 1998). For example, serial depletion or "fishing down" has resulted in heavily depleted populations of large fish, seabirds and marine mammals. The additional impact of climate change is likely to push some of the endangered species of marine fauna beyond their tipping point.

Otago context

16. The Otago coastline is home to two endemic marine mammals, the New Zealand sea lion and New Zealand (Hector's) dolphins. Both are declining due to bycatch in fishing nets. Several other species of marine mammals, as well as seabirds, sharks and fish populations, share the same impacts. For example, Yellow Eyed Penguin or hoiho have a small relict population on Otago Peninsula with most of the population now being found in New Zealand's sub-Antarctic Islands.
17. The NZ dolphin population is a small remnant of an originally much larger and more continuous population (Diver 1866, Slooten et al. 2013, Turek et al. 2013). Likewise, NZ sealion was originally found around the entire NZ coastline, with pups born near North Cape (Collins et al. 2014). They are now confined to Otago, Southland and New Zealand's sub-Antarctic islands. Otago is one of the few places in the country, and therefore in the world, where New Zealanders and tourists can see NZ sea lions routinely simply by walking on a beach. This experiential attribute is at risk from fisheries impacts and disturbance.
18. Main indicators of pressure on local populations include:
 - Species that are found only in New Zealand
 - Long-lived species that are slow reproducing
 - Small population size
 - Substantial population depletion from original (pre-human and pre-commercial fishing) levels
 - Population decline
 - Population fragmentation
 - Number of animals caught in fishing gear each year
19. Causes and drivers of these problems:
 - Fishing
 - Direct fisheries mortalities in gillnets and trawl nets
 - Indirect impacts due to prey depletion and habitat degradation
 - Range of additional threats, including oil & gas exploration and exploitation, pollution (including sewage, agricultural chemicals and other domestic and industrial forms of pollution), threat of tidal turbine developments for energy generation

- Most of these additional threats are much lower level than fishing impacts, but are contributing factors
 - There is an urgent need to avoid introducing and start reducing these threats wherever possible
20. Climate change will aggravate these already unsustainable human impacts. There is an urgent need to assess and resolve cumulative impacts on endangered species in the Otago coastal environment. Impacts that are readily avoidable (e.g. by changing to selective fishing methods) should be a top priority.
 21. To ensure continuity of fishing we urgently need to make the transition to selective, sustainable fishing methods – that are also dolphin-safe, sealion-safe, marine protected species-safe.
 22. Current rates of exploitation of our marine resources are far from sustainable, even within the narrow scope of considering target fish species only. If we still want to be making money from fishing in 20, 30, 50 years we need to make some changes now.
 23. The wider ecosystem impacts of fishing need to be compared to the benefits from marine tourism. Continuing to impact endangered species of marine mammals and seabirds is incompatible with developing a tourism industry based on these species.
 24. The Quota Management System intended to give fishermen ownership of the resource, resulting in better stewardship. What actually happened is that almost all of the quota has ended up in the hands of a small number of large companies. Most fishermen lease their quota from these companies. This has reduced the interest in and ability to manage for the future, because individual fishers can't afford to make decisions that will reap benefits in the medium to long term. The government (public of NZ) gave away these quotas to individual fishermen, in the hope they would look after the resource. In fact, we have given the resource to a few very affluent individuals who are now exploiting fish stocks and exploiting less powerful individuals in the fishing industry.

CONCLUSIONS THAT CAN BE DRAWN FOR OTAGO

25. One of the most important "ecosystem services" of the marine environment is carbon sequestration. By overloading the system, this service has already been seriously degraded. Further impacts on marine fauna and flora are further degrading this and other "ecosystem services" provided by marine ecosystems.

26. Reducing the impact of climate change requires actions that will lead to avoidance of further increases in temperature and acidification (e.g. reducing green house gas emissions) rather than focusing on adaptation, as if further climate change is unavoidable.
27. Such action would dramatically reduce the overall cost of climate change to local communities. More effective integration of the actions and strategies of central and local government agencies will be required to solve both fishing and climate change problems.
28. An urgent focus on cumulative impacts and dealing with impacts that are readily avoidable will be essential in terms of improving resilience of the local marine ecosystem to environmental changes predicted to occur due to climate change.
29. Increased human use of the coastal environment would be high risk in terms of potentially failing to retain the range of habitats provided by the coastal marine area for species like hoiho and NZ sea lion. This includes construction projects (e.g. subdivisions, marina developments) and dumping of dredge spoils from the harbour into the marine environment.
30. Careful monitoring of populations of threatened marine life, including marine mammals and seabirds, as well as improved protection measures are urgently required.
31. A lack of coordination among local and central government agencies, and a lack of attention to cumulative impacts, are the most serious obstacles to resolving these local conservation issues.

Professor Elisabeth Slooten

Date:

REFERENCES

Brander, K.M. 2007. Global fish production and climate change. Proceedings of the National Academy of Sciences (USA) 104: 19709-19714.

- Collins CJ, Rawlence NJ, Prost S, Anderson CNK, Knapp M, Scofield RP, Robertson BC, Smith I, Matisoo-Smith EA, Chilvers BL, Waters JM. 2014. Extinction and recolonization of coastal megafauna following human arrival in New Zealand. *Proc R Soc B*. 281:20140097
- Diver, P. 1866. *Guide to Brighton and It's Environs: Containing every information necessary for visitors to this Otago Watering Place*. Dunedin, Fergusson and Mitchell.
- FAO 2008. Report of the FAO Expert Workshop on Climate Change Implications for Fisheries and Aquaculture. Food and Agriculture Organisation Fisheries Report No. 870.
- IPCC 2007. Fourth Assessment Report of the Intergovernmental Panel on Climate Change. www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm
- Pauly, D., Christensen, V., Dalsgaard, J., Froese, R. and Torres, F. 1998. Fishing down marine food webs. *Science* 279: 860-863.
- Slooten, E. 2013. Effectiveness of area-based management in reducing bycatch of the New Zealand dolphin. *Endangered Species Research* 20: 121-130.
- Turek, J., Slooten, E., Dawson, S., Rayment, W. and Turek, D. 2013. Distribution and abundance of Hector's dolphins off Otago, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 47: 181-191.