



Date: 9 December 2016
To: Guy Kerrison, RMA Policy Manager
CC: Sarah McRae; Jane Gunn
From: Andrew Baxter, Technical Advisor, Marine

Subject: Review of marine mammal report, Cawthorn and Associates

Introduction

As part of the Marlborough Salmon Working Group process, Cawthorn and Associates prepared a report (“the August 2016 report”) for the New Zealand King Salmon Co. Limited assessing the impacts on marine mammals of relocating up to six salmon farms to nine potential new sites. The Ministry for Primary Industries (MPI) has asked me to review the report.

Comments on first draft

I provided comment on the first draft of the report directly to Martin Cawthorn in May and June 2016, verbally and as comments or edits within the draft document.

Those comments focussed on various factual corrections (e.g. threat status of marine mammals) and suggested improvements to the document. In particular, a more detailed risk assessment was recommended including:

- Location – e.g. Tory Channel compared to Waitata Reach or side bays in Queen Charlotte Sound; inshore versus offshore;
- Likelihood of encounters;
- Relative risks of proposed new sites versus existing low flow sites;
- Risk of entanglement by species;
- Conventional net design versus Polarcirkels – net design, farm layout;
- Mitigation and management options.

Those comments and suggestions are not reproduced in full here given they related to the first draft only and various changes have now been made to the report. It would also be difficult to do so given the nature of this initial feedback as track changes and comments embedded in the draft report, as well as verbal discussions.

Comments on August 2016 report

Scope

The following assessment is not a comprehensive peer review. I have not double-checked all the data referred to in the August 2016 report, nor have I undertaken a thorough review of the scientific literature including the references listed in the report.

Instead, I have reviewed the August 2016 report from the basis of my own professional knowledge about the issues, including the work I carried out while preparing my evidence for the 2012 Board of Inquiry hearing to consider New Zealand King Salmon Co. Limited's private plan change and resource consent applications¹. I also draw on the review by Forrest *et al.* (2007)² which includes a comprehensive evaluation of the effects of fish farming on New Zealand marine mammals. That review concluded with respect to marine mammals:

“Potential effects on ... marine mammals (seals, dolphins and whales) relate mainly to habitat modification, entanglement in structures and habitat exclusion ... New Zealand fur seals are a problematic species around salmon farms, leading to use of predator exclusion nets around most sea-cages. In approximately 25 years of sea-cage salmon farming in New Zealand there have been four entanglements of marine mammals (2 seals, 2 dolphins) in predator nets. Subsequent management responses (e.g., changes to net design, development of protocols for net changing) mean that entanglement is unlikely to be a significant ongoing issue. Exclusion of marine mammals from critical habitat by finfish farms is highly unlikely at present in New Zealand given the small scale of the industry, and risks from future development could be minimised by appropriate site selection.”

My assessment also does not consider:

- cumulative effects – multiple salmon farms, aquaculture more generally, and other non-aquaculture pressures on marine mammals (e.g. fisheries bycatch, vessel strike, tourism, and noise). There was insufficient time to address these broader matters and in any event the final relocation proposal has yet to be finalised.
- the indirect effects of the salmon farms on marine mammals by altering water quality or benthic habitats. These latter matters are addressed in separate reports commissioned by MPI.

I note that the August 2016 report also does not address these other matters in any detail and their inclusion would require a substantial revision.

Lastly, I ignore minor editorial or grammatical errors, though do comment on some structural matters where significant.

¹ Statement of evidence in chief of Andrew Stephen Baxter for the Minister of Conservation in relation to marine mammals; 9 August 2012.

² Forrest B, Keeley N, Gillespie P, Hopkins G, Knight B, Govier D. 2007. Review of the ecological effects of marine finfish aquaculture: final report. Prepared for Ministry of Fisheries. Cawthron Report No. 1285. 71p.

Comments on report

The following comments largely follow the order of the document. Page references are given, but unfortunately the August 2016 report does not include paragraph numbering to make cross referencing easier.

1. Printing issues. The report has some formatting issues that were not apparent on screen but were problematic when I printed it off. These should be corrected.
2. Structural issues between Sections 5, 6 and 7. Perhaps these issues arose when the report was reformatted from the second draft received in August 2016. I recommend combining these three sections into the one section, with separate subheadings for steel system pens and Polarcirkel cages. The current subheadings in Section 6 are unnecessary and could be removed.
3. Section 5. Page 5. The first paragraph notes "*Polar Circle type pens have not been used in the past*". However, this type of net design was used in Crail Bay, as noted in Section 13.2 of the report. This discrepancy should be corrected.
4. Table 2. Incorrect cross referencing to Section 11.1 of the report for southern right whales. (Note suggested restructuring of the document would also affect this cross referencing; see comments directly below.)
5. There is a disconnect between Sections 11, 12 and 13. Again, perhaps these issues arose when the report was reformatted from the second draft received in August 2016. Section 11 is headed "*Numbers and seasonality of marine mammals in the area*" yet only deals with New Zealand fur seals (section 11.1). Sections 12 and 13 deal with whales and dolphins respectively. These three sections need to be amalgamated or the headings changed to be accurate.
6. Section 13.2. Page 12. The second paragraph refers to two dusky dolphin entanglement mortalities in a salmon farm in Crail Bay, whereas later, in Section 18, the report refers to two bottlenose dolphins based on my 2012 evidence where I stated:

"In his evidence, Mr Cawthorn reports on several reported dolphin deaths in salmon farms over the years (paragraph 31): two dusky dolphins at Ruakaka in 1999, a dead Hector's dolphin at Ruakaka in 2005, two dusky dolphins in Crail Bay in 2011 and one dusky dolphin at Wahinau in 2012.

The Department of Conservation's records differ in that one of the 2011 Crail Bay dolphins is thought to be a bottlenose dolphin rather than a dusky dolphin (based on the advice of NZ King Salmon worker Mr Jade McCartney to Mr Mike Aviss, Sounds Area Office, Department of Conservation). Unfortunately due to a misunderstanding the carcass was not recovered for a positive identification or a post mortem. The Department also has a separate record (also from Mr McCartney) of another bottlenose dolphin drowning in a loose half removed

predator net in Crail Bay about 12-18 months ago, prior to this farm being taken over by NZ King Salmon.

7. Reference to these uncertainties and the additional information would be helpful. For completeness, sections 13.2, 13.4 and 13.5 report should also be updated to refer to the two dead dusky dolphins at Ruakaka in 1999, the two possible bottlenose dolphins in Crail Bay, and a dead Hector's dolphin at Ruakaka in 2005 (refer quotation above and reference to Mr Cawthorn's 2012 evidence).
8. Section 13.2. Page 13. References to the sources of information for the three bottlenose dolphin population estimates would be helpful. As noted in my 2012 evidence, *"the most comprehensive and recent study on bottlenose dolphins in the Marlborough Sounds is that reported in Merriman et al (2009). This study found that bottlenose dolphins in the Sounds are part of a larger top-of-the south coastal population consisting of 385 individuals, with 211 (95% CI = 195 – 232) dolphins utilising the Sounds per annum."* The reference in the August 2016 report to the *"Cook Strait/Marlborough Sounds population, extending south to Westport"* being 211 (95% CI 195-230) is therefore incorrect.
9. Section 13.5. Pages 13-14. There is some potential confusion in this section with respect to the aerial surveys for the east and west coasts of the South Island. The referenced Mackenzie and Clement (2014) report only relates to the east coast South Island survey, not to the east and west coasts as otherwise implied. There is a separate report for the west coast survey (Mackenzie and Clement 2016³). It should be highlighted later in the third paragraph that the quoted figures only relate to the east coast South Island population. Note Mackenzie and Clement (2016) report the total South Island population as follows:

"Following a reanalysis of the ECSI and SCSI survey data, our estimate for the total Hector's population around the South Island (excluding sounds and harbours) is 14 849 (CV: 11%, 95% CI 11 923–18 492). This estimate is approximately double the previous estimate from surveys conducted in the late 1990s – early 2000s (7300; 95% CI 5303–9966), with the difference primarily due to a much larger estimated population along ECSI, distributed much further offshore than previously thought. Densities are similar along ECSI and WCSI."

10. Section 15. Page 19. The August 2016 report states *"Typically, humpbacks that have become entangled in craypot buoy lines or other similar slack floating lines generally did so by accident rather than from curiosity."* There is no reference to support this statement. Indeed, I am aware of a humpback whale which was observed playing with a lobster pot buoy off Kaikoura Peninsula, bobbing the buoy up and down with its head. Humpback whales are known to approach vessels. Various factors may contribute to humpback whales being prone to entanglement in fishing gear, including their large pectoral flippers and flukes,

³ D.I. MacKenzie and D.M. Clement 2016. Abundance and Distribution of WCSI Hector's dolphin. New Zealand Aquatic Environment and Biodiversity Report No. 168. <http://www.mpi.govt.nz/document-vault/12129>

inquisitive behaviour (especially juveniles), and apparent propensity to roll when partially entangled.

11. Section 15. Page 19. The last two paragraphs in this section are out of place as they relate to dolphins and not humpback and southern right whales.
12. Section 16. Bullet point 2 states farms are continuously manned. My understanding is this will not necessarily be the case for some of the new proposed sites (e.g. mid Waitata).
13. Section 16. Bullet point 4-6 relate to set netting impacts. While relevant as contextual information, these matters are not directly relevant for why whales, dolphins and seals are unlikely to be affected by fish farms (which is the topic of the preceding paragraph).
14. Section 16. Bullet points. A key factor for decreasing or minimising the likelihood of entanglements in fish farms is the use of tensioned predator netting and anchor warps. I suggest these mitigation measures should be explicitly included in the list (even if they might be implicitly included within “*effective maintenance of operations*”).
15. Section 17 and Table 5. I found Table 5 unclear and confusing. The reference at the bottom of the table to risk level (x to xxxx = Negligible to Low) [# to ##### = Moderate] [+ to ++++ = High) is confusing and does not relate to the Table. The second column (“Risk level”) is also unclear; is this an overall risk assessment across the three species groups? The text and table needs to be amended to improve clarity.
16. Section 18. NZCPS policy 11(b)(iv) (“*habitats, including areas and routes, important to migratory species*”) is also relevant for marine mammals. Southern right whale and humpback whale should be added as species under this section. Both are migratory and are classified as threatened species (see Table 2 of the August 2016 report).

Conclusion

Although I have identified many suggested changes and improvements to the report, these are unlikely to affect materially the report’s overall conclusions. They are nevertheless needed to improve the accuracy and readability of the report.

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