

Contents Page: Friends of Nelson Haven and Tasman Bay and Kenepuru & Central Sounds Residents Association – Part 2

All written comments received on the MPI salmon relocation proposal, grouped according to surname/business/organisation/Iwi name.

Written Comments Number	Last Name	First Name
598	Friends of Nelson Haven and Tasman Bay and Kenepuru & Central Sounds Residents Association: PART 2	

IN THE MATTER OF

**POTENTIAL RELOCATION OF SALMON FARMS IN THE
MARLBOROUGH SOUNDS PROPOSAL TO
AMEND THE MARLBOROUGH SOUNDS
RESOURCE MANAGEMENT PLAN TO ENABLE
THE RELOCATION OF UP TO SIX EXISTING
SALMON FARMS BY REGULATIONS
MADE UNDER SECTION 360A OF
THE RESOURCE MANAGEMENT ACT 1991**

MPI DISCUSSION PAPER NO: 2017/04

STATEMENT OF EVIDENCE OF

ROB SCHUCKARD

For Friends of Nelson Haven and Tasman Bay Inc.

and

Kenepuru & Central Sounds Residents Association Inc.

March 2017

Written Comment No: 0598

- 2 -

Summary:

- i. This new application for expansion of salmon farming is applying for almost 24,600 tonnes of additional feed. In Waitata Reach, an increase of feed levels from consented 10,000 tonnes (maximum limit set by Board of Inquiry [BOI] for recently consented farms) with an additional 23,000 tonnes goes beyond the precaution identified by BOI in 2012 to mitigate uncertainty.
- ii. If this proposal proceeds, total salmon production will contribute almost as much nitrogen to the Marlborough Sounds as all other sources.
- iii. About 20% of all the waste from salmon farming is settling on the bottom of the marine environment underneath and in vicinity of the salmon farms. Deposition of this waste will be assessed through consent monitoring according to the Best Management Practice Guidelines (BMP). The other 80% of soluble waste is dispersed through the water column with unknown effects to the environment. The Minister has failed to take into consideration the cumulative effect of this expanding activity of salmon farming on the wider Marlborough Sounds environment. Concerns for potential and cumulative effects of the expansion of salmon farming within Pelorus Sound were expressed by the Board of Inquiry as a great concern.
- iv. BMP is a monitoring tool for compliance. Occupancy of new fast flow areas will change the benthic environment from the natural Enrichment Stage (ES) 1.5-2.0 (pristine or semi pristine) into ES 3.0-5.0. This change of further eutrophication will result in less species diversity and is not an environmental benefit.
- v. Of the 43,000 tonnes of salmon feed that was applied for in 2012, 14,000 tonnes were allowed by the BOI and in accordance with an adaptive management regime only. The Supreme Court ruled that this approach of adaptive management reflected in both the plan and the consent conditions, was consistent with a proper precautionary approach.
- vi. Baseline environmental studies are effectively designed to establish the environmental conditions at a site prior to any site development. Once established, these "baseline" conditions then provide a benchmark against which to monitor and manage any potential future impacts resulting from industrial operations at the site.
- vii. The baseline of 2012 was established to monitor 'effect' through adaptive management from the 10,000 tonnes of additional feed to be used in the new farms in the Waitata Reach. This precautionary approach through adaptive management was required to mitigate the uncertainty that was identified by the BOI with respect to water-column effects. Whereas the BOI farms in

- 3 -

the Pelorus Sound have only recently been established, no monitoring report about the effect has been produced as yet.

- viii. In 2016 a new NIWA model was designed to measure the effect of 23,000 tonnes of feed from the proposed relocated farms in Waitata Reach. Instead of using the 2012 baseline, a new 2016 baseline was established integrating the 10,000 tonnes of feed from BOI farms. Where no monitoring reports have been presented to measure effect from the BOI farms, in my view the new model is thus pre-empting outcomes from monitoring that as yet has to be reported on which is both unwise and unacceptable. The careful and precautionary approach demanded by the BOI when granting consent for up to 10,000 tonnes of feed was required in order to achieve sustainable outcomes. An additional 23,000 tonnes without that carefully staged monitoring process is irreconcilable with the intent and objectives of the BOI decision.
- ix. The new baseline has not developed a scenario where all farms have been integrated in the model. Calculations on feed loads to establish the 2016 baseline seem to be set excessively high. The hydrodynamic models are being stretched beyond their original scope and purpose, particularly in the Pelorus Sound.
- x. Environmental concerns from the proposal from the impacts of benthic and water column changes, noise and additional light all have the significant potential to adversely affect the feeding habitat of King Shags in the Marlborough Sounds. The species is estimated at 839 birds and assessed to be "VULNERABLE", where this "*species is facing a high risk of extinction in the wild in the medium-term future.*"
- xi. Birds from the largest colony Duffers Reef are the most potentially affected by the proposal of relocating and expanding salmon farming activity in the Marlborough Sounds. The expansion is happening in the area where most birds from Duffers Reef forage.
- xii. Increase of phytoplankton biomass through eutrophication is likely to impact on the light penetration to the deeper water layers and benthic communities, potentially decreasing the area suitable for King Shags to forage.
- xiii. King Shag is dependent on deep benthic prey, including witch flounder, a species of flatfish most commonly known to occur in deeper waters. Shags in general require a high density of prey species. Small declines can have a severe impact on the viability of the species.
- xiv. Harmful algae blooms (HAB) already occur in the Marlborough Sounds and management of these phenomena should reflect constraint in the release of nitrogen. The impact of some toxic

- 4 -

and harmful algae on seabirds reveal an array of responses by birds ranging from reduced feeding activity, inability to lay eggs, loss of motor coordination and death.

- xv. Further eutrophication of the Sounds through further increase of salmon farming should be avoided and a precautionary approach adopted through adaptive management of recently consented farms, as directed by the BOI decision.

Qualifications as an Expert and Scope of Evidence

1. My name is Rob Schuckard. I hold a Master of Science in Biology (University of Amsterdam – 1979 - ornithology). In New Zealand we live in the Marlborough Sounds where I operated between 1989 and 2000 two mussel farms in the Pelorus Sound. In 2005, our property received the Marlborough Rural Environment Award for Forestry and the Supreme Award for the work we have been carrying out on our property, where we integrated conservation and commercial aspirations as custodians of our land.
2. I have been involved in a number of ornithological projects with authored or co-authored publications in a range of journals. I also have been involved and still participate in a range of community and/or conservation projects. At the moment I am involved as:
 - a. Environmental officer of French Pass Residents Incorporated – since 1997.
 - b. Committee member for Friends of Nelson Haven and Tasman Bay – 1998-2002 and since 2011.
 - c. Member of the Sounds Advisory Group – since 2010
3. I have considerable experience with projects to study marine and shorebird species including their population dynamics.
 - a. Shorebird studies in the South Island of New Zealand.
 - b. Benthic biodiversity of Farewell Spit.
 - c. Biodiversity studies of seabird, marine mammals and pelagic fish of Tasman and Golden Bay.
 - d. New Zealand King Shag projects.
 - e. Australasian Gannet from Farewell Spit projects.

- 5 -

4. I presented evidence for Sustain our Sounds for a Board of Inquiry to consider The New Zealand King Salmon Co. private plan change request to the Marlborough Sounds Resource Management Plan through resource consent applications for nine new sites for salmon farming.
5. As a community-representative I have participated in a number of aquaculture working groups:
 - a. Best Management Practice Guidelines for Salmon Farms in the Marlborough Sounds.
 - b. Marlborough Salmon Working Group preparing the advice to Ministry for Primary Industries (MPI) on relocation of low flow farms.
6. During the 2012 Board of Inquiry process a number of concerns were raised regarding the effect of salmon farming on New Zealand King Shag. The Board directed the consent holder to establish a King Shag Management Plan (KSMP) for those newly to be established farms in the Waitata Reach, where overlap with the feeding areas of the New Zealand King Shag occurs. In 2015, I prepared for New Zealand King Salmon a King Shag Management Plan.
7. I have presented expert evidence for five Environment Court cases and a Board of Inquiry. I have read and agree to abide by the code of conduct for expert witnesses as set out in the Environment Court's Practice Note 2011.

Scope of Evidence

8. I have been asked by the committee of Friends of Nelson Haven and Tasman Bay to prepare an analysis of the environmental impact of the proposal to relocate and expand salmon farming in the Marlborough Sounds with particular regard to the impact on New Zealand King Shag (*Leucocarbo carunculatus*).

Preamble – Status of the Marlborough Coastal Marine

Environment

9. The relocation for salmon farms is being considered by the Minister of MPI as a way to:

‘..ensure the environmental outcomes from salmon farming are improved through implementation of benthic best management practice (BMP). ‘

– 6 –

However, the Marlborough Salmon Working group identified a wider role for its advice to the Minister with a broader definition of ‘environmental outcomes’:

‘to ensure the enduring sustainability of salmon farming in Marlborough, including environmental outcomes and landscape, amenity, social and cultural values.’

10. The ‘*environmental outcomes from salmon farming*’ as referred to by the Minister as an objective is not necessarily synonymous with the ensuring of ‘*enduring sustainability of salmon farming in Marlborough, including environmental outcomes and landscape, amenity, social and cultural values.*’
11. The primary purpose of the Best Management Practice Guidelines (BMP¹) is to provide consistent and clear requirements for the independently conducted, annual benthic monitoring and management of existing farms. Whereas about 20% of the waste is settling on the benthic environment, too much emphasis is placed on benthic BMP. The Minister has failed to take into consideration the cumulative effect of this expanding activity of salmon farming on the wider environment and whether sustainable management (as also is defined in the BMP²) has been achieved.
12. The Minister (surprisingly) continues that this proposal provides for industry growth through more efficient use of marine farming space, rather than from creating additional new space. Expanding the activity of aquaculture into the CMZ1 zone (prohibited for aquaculture) is a serious breach of the foundation and intention of the Plan’s objective. To perceive such a proposition as ‘more efficient use of marine farming space’ is irreconcilable with the prohibited status of that activity in the Plan, while doubling the overall productivity of salmon farming.
13. A total feed use of the low flow sites in CMZ2 is about 5,700 tonnes and the maximum feed use for the newly proposed fast flow sites will be about 25,000 tonnes. This will effectively mean an almost fivefold increase in production compared to existing (to be relocated) low flow sites. To use the surface area as a parameter to measure expansion is incorrect. A farm is the portal for further environmental pressure through feed use leading to coastal eutrophication. Feed use of all farms owned by NZKS (including three BOI approved farms using adaptive feed levels) can

¹ Keeley, N. *et al.* 2014. Best Management Practice Guidelines for salmon farms in the Marlborough Sounds: Benthic Environmental Quality Standards and Monitoring Protocol. Final 2014.

² ‘Sustainable management’ as defined in Section 5 of the RMA (1991): “managing the use, development and protection of natural and physical resources in a way, or at a rate which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while: (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystem; and (c) Avoiding, remedying or mitigating any adverse effects of activities on the environment.”

- 7 -

increase through adaptive management to 28,000 tonnes. The proposal of relocation as proposed by the Minister is almost doubling this total production level of the industry.

14. The Marlborough Sounds Resources Management Plan is the contract designed for the wellbeing of all the its people, stakeholders, departments, industry etc. Whether the intentions of the MSRMP are maintained through a Plan Change to effectively double the production of one resource user through expansion of salmon farming in the prohibited area for aquaculture is difficult to reconcile.
15. The Marlborough District Council, during the BOI process, explained that the areas identified as CMZ1 in the Plan have a fundamental role to play to offset areas where aquaculture is permissible³: '.....Mr. Jerram (Councilor MDC and chairperson of the Environment Committee) and Mr. Hawes (Planner MDC) made it clear in their evidence that the Council does not support any modification of the CMZ1 boundaries. Mr. Jerram confirmed that in his view: *'The whole idea of a prohibited zone is that it is prohibited in perpetuity I would have said.'* The Marlborough Sounds Resource Management Plan is the contract that provides the balance between competing views.
16. Coastal decline of biodiversity is a worldwide problem, most often caused by anthropogenic stressors. This same decline has also been identified in the Marlborough Sounds⁴:
'Marlborough's marine biodiversity is not in good shape, particularly in the Sounds. The significant issues are: fewer fish, not as many species, serious loss of biogenic habitats, sedimentation in estuaries smothering thousands of hectares of seabed and biosecurity incursions.'
17. The marine environment of the Marlborough Sounds is largely unprotected and subject to various anthropogenic activities affecting the quality and resilience of the ecosystem. To accommodate these uncertainties, the Marlborough Resource Management Plan has identified areas where e.g. aquaculture is prohibited.
18. The Board of Inquiry (BOI) identified the Waitata Reach as one of the least modified parts of the Sounds⁵. About marine farming, the BOI also identified that:

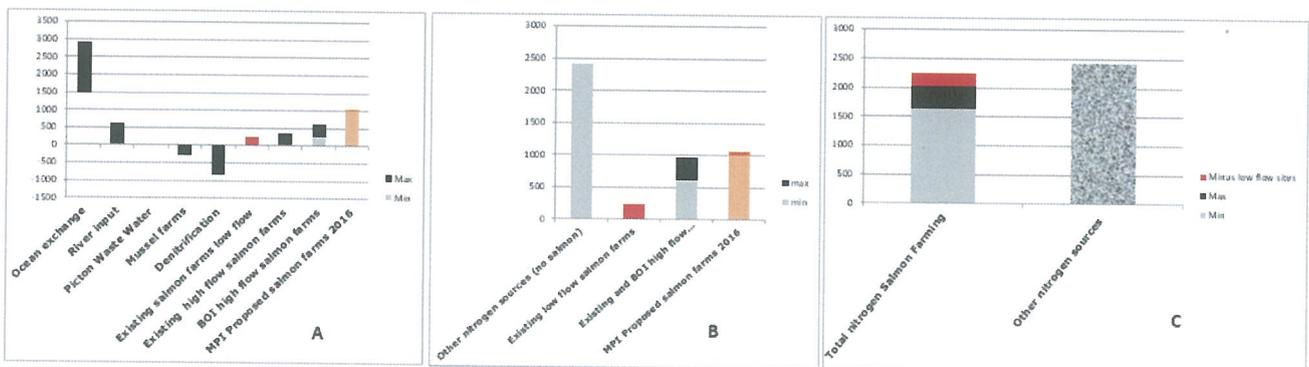
³ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [167]

⁴ State of the Environment Report 2015. Our Land, Our water and Our Place. Marlborough District Council, pp150.

⁵ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [575], [576].

'Fortunately, few of these current operations extend beyond their more sheltered bay margins out into the Sounds' main channels.'

19. A number of nitrogen sources and sinks were identified by the Board of Inquiry in the Sounds environment.⁶ Nitrogen and phosphorus loading into marine waters can initiate a biological process of eutrophication that, depending on the volume and duration of nutrient loading, and the assimilative capacity of the receiving waters, can culminate in a fundamental shift in the food web structure of an area and lead to ecological simplification, disrupting normal ecosystem functioning. It finally can result in a shift of phytoplankton species composition and create conditions that are favourable to nuisance and toxic algal blooms.
20. Also in the Marlborough Sounds, nitrogen is the limiting element for marine productivity⁷. The proposal by the Minister is doubling the nitrogen release from the activity of salmon farming to about 2000 tonnes. This is almost equalling all other nitrogen sources in the Sounds, including the main other source, the upwelling from Cook Strait.



Nitrogen sources (tonnes) in Marlborough Sounds compared to existing and proposed salmon farms: **A - All sources itemized, B - All N-sources different from salmon farming amalgamated, C - Salmon farming nitrogen contribution compared to all other sources (red is nitrogen from to be relocated low flow farms).**

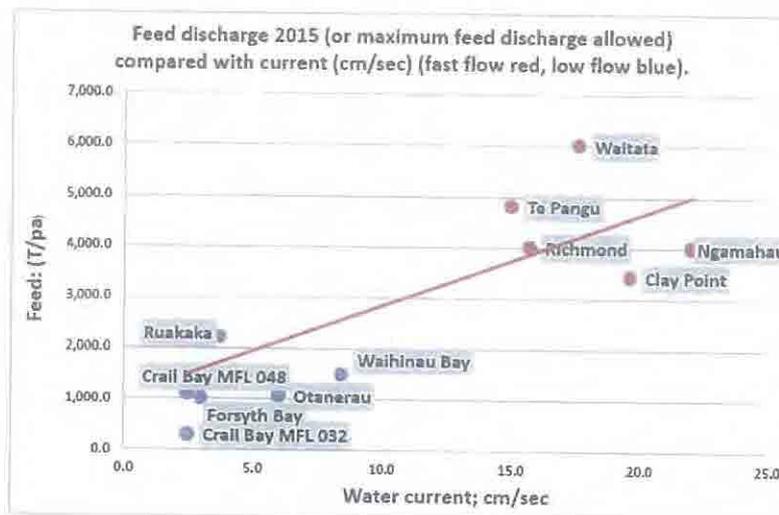
21. The percentage of total nitrogen and phosphorus input from feed that is lost to the aquatic environment is substantial. In general term, about 60%-80% of all the nitrogen and phosphorus in feed will be released into the environment. About 85% of the waste will be in dissolved forms (ammonium, urea, nitrate, together called dissolved inorganic nitrogen DIN), and the rest is in particulate form⁸. The assessment and control of the benthic footprint through a monitoring

⁶ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [377]

⁷ Broekhuizen, N., Hadfield, M., Plew, D. (2015) A biophysical model for the Marlborough Sounds part 2: Pelorus Sound. National Institute of Water & Atmospheric Research Ltd, NIWA Client Report (for Marlborough District Council) CHC2014-130 (project MDC13301): 163.

⁸ Zeldis, J. 2008. Exploring the carrying capacity of the Firth of Thames for finfish farming: a nitrogen mass-balance approach. Prepared for Environment Waikato. NIWA Client Report: CHC2008-02. June 2008. NIWA Project: EVW08501.

protocol for salmon farms⁹ is only dealing with up to 20% of all the waste that is created through this activity. Feed use of salmon farms can be directly correlated with the water currents around the farm, where higher currents disperse pollutants over a wider area. As a result, the industry has higher feed and production levels in high flow areas. At this stage, feed levels of all low flow farms are about 5700 tonnes and 22,000 tonnes for fast flow (when using the maximum feed levels for Board of Inquiry consented farms).



22. The Minister is intending to use executive powers under section 360A-C of the RMA. However, the Minister of Aquaculture can only make a recommendation if the Minister 360B (c) is satisfied that (ii) the matters to be addressed by the proposed regulations are of regional or national significance.
23. It is not clear how the 5700 tonnes of feed from low flow farms can be an issue of regional or national importance, unless the expansion to a total of 24,600 tonnes for the total relocation proposal is the true objective of what the Minister is trying to achieve. The Minister is completely bypassing the precautionary approach of salmon farm developments that was required by the Board of Inquiry to overcome uncertainties identified in the consenting process.

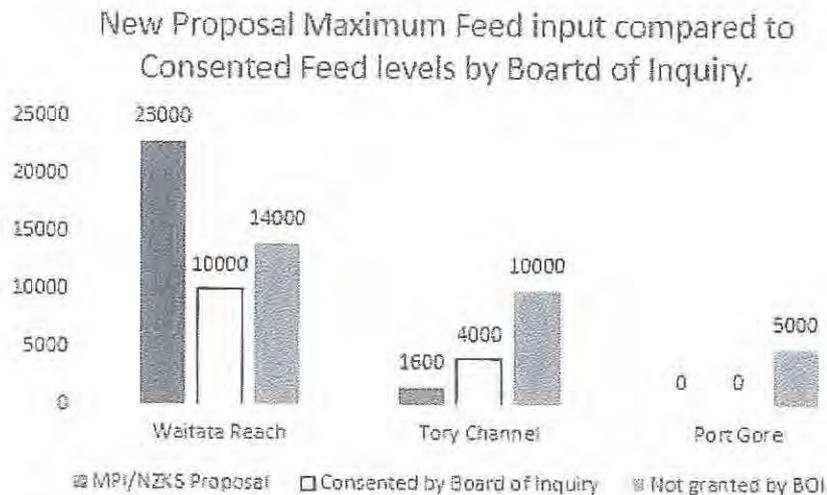
⁹ Keeley, N. *et al.* 2014. Best Management Practice Guidelines for salmon farms in the Marlborough Sounds: Benthic Environmental Quality Standards and Monitoring Protocol. Final 2014

Written Comment No: 0598

- 10 -

For the Waitata Reach, the BOI considered about 24,000 tonnes of salmon feed unsustainable and only granted consents authorizing a maximum discharge of 10,000 tonnes.

24. As stated, the two consented farms in the Waitata Reach were allowed to progress through adaptive management to a maximum feed discharge of 10,000 tonnes. To date, no publicly available monitoring reports are available to provide an initial understanding of the impact of the two BOI farms on the Waitata Reach. While the two BOI farms with up to 10,000 tonnes of feed are in adaptive management, the 'relocation proposal' expands the maximum production in the Waitata Reach with an additional 23,000 tonnes. This latter amount is similar to the total amount that was originally considered by BOI (24,000 tonnes), but is in addition to the 10,000 tonnes set as threshold for consent of salmon farming in Waitata Reach by the BOI in 2012.



25. The use of 23,000 tonnes of feed per annum in Waitata Reach (excluding the BOI farms) is an additional nitrogen source equivalent to about 180,000 people¹⁰. The waste will be released between 2 and 10km from Duffers Reef, the main feeding area of the biggest King Shag colony. I would regard the potential impact of eutrophication in this main feeding area as an unacceptable experiment, threatening the survival of a very significant portion of the total King Shag population. A shift of phytoplankton species composition can create conditions that are favourable to nuisance and toxic algal blooms. Impacts of toxic algae on seabirds reveal an array

¹⁰ If we estimate a feed conversion rate of 1.8, and the production of 1 tonne of salmon to be comparable with the nitrogen release of 14 people: 23,000 / 1.8 ~ 13,000 tonne salmon. 13,000 tonnes salmon x 14 people ~ 180,000 people. (see EIC R. Schuckard for Sustain our Sounds for Board of Inquiry to consider The New Zealand King Salmon Co. Limited's private plan change requests)

- 11 -

of responses ranging from reduced feeding activity, inability to lay eggs, and loss of motor coordination and death¹¹. Bird deaths caused by HABs have been widely reported¹². Some of the dinoflagellate produced foam destroys the waterproof layer of feathers that keeps seabirds dry, restricting flight and leading to hypothermia. One of these dinoflagellate *Akashiwo sanguinea* is regularly blooming in Opua Bay, Tory Channel¹³.

26. The future challenges to already degrading coastal habitats will be exacerbated by predicted climate change and its impact on algal blooms¹⁴. Climate-induced changes in salinity, temperature and mixing, which all influence both oxygen conditions and species mean that hypoxia (low oxygen concentration) tolerance will be of importance. Climate change is a rather new phenomenon and it is only relatively recently that we are seeing attempts to integrate more and more the consequences of this new reality. The impacts of eutrophication, independent of the source of the flux, will be significantly influenced by this new reality. Both changes in climate forcing and nutrient loadings are aspects of global change that is expected to profoundly impact coastal hypoxia through more stratified water conditions.
27. Planning towards these realities is not reflected in this proposal and the precautionary advice from the BOI decision has gone missing from the analysis of proposal No: 2017/04.
28. The effects of large-scale climate warming are causing long-term variations in oxygen content and saturation as an observed increase in temperature has led to a general decrease in oxygen solubility of water masses. Mitigation of effects should reflect the realities of an uncertain future and we should not take comfort from the poorly known assimilation capabilities of the marine environment to date.

New Zealand King Shag (*Leucocarbo carunculatus*)

¹¹ Shumway, S.E., Allen, S.M., Boersma, P.D. 2003. Marine birds and harmful algal blooms: sporadic victims or under-reported events? *Harmful Algae* 2, 1:1-17.

¹² Lewitus, A.J., Horner, R.A., Caron, D.A., Garcia-Mendoza, E., Hickey, B.M., Hunter, M., Huppart, D.D., Kudela, R.M., Langlois, G.W., Largier, J.L., Lessard, E.J., RaLonde, R., Rensel, J.E.J., Strutton, P.G., Trainer, V.L., Tweddle, J.F. 2012. Harmful algal blooms along the North American west coast region: History, trends, causes and impacts. *Harmful Algae* 19:133-159

¹³ L. McKenzie presentation Aquaculture review meeting 3 October 2016 (NIWA, Wellington)

¹⁴ Al-Ghelani, H.M., AlKindi, A.Y.A., Amer, S., and Al-Akhzami, Y.K. 2005. Harmful Algal Blooms: Physiology, Behavior, Population Dynamics and Global Impacts - A Review. *SQU Journal For Science*, 10: 1-30.

Written Comment No: 0598

– 12 –

29. New Zealand (including Macquarie Island) is home to 7 of the 16 taxa of blue-eyed shags. These seven taxa have the lowest number of individuals among the *Leucocarbo* group. King Shag is considered a discrete species which does not share sub-species status with the other mainland taxon, Stewart Island Shag (*Leucocarbo chalconotus*)¹⁵.
30. New Zealand King Shag (King Shag) is one of the rarest seabird species in the world, endemic to the Marlborough Sounds. The average total population of King Shags is estimated to be 839 birds, with 85% of all existing birds located at five distinctive colonies; Rahuinui Island, Duffers Reef, Trio Islands, Sentinel Rock and White Rocks. In 2015, 187 pairs/nests were recorded¹⁶.
31. More recent studies indicate significant inter-annual variation in breeding success. Preliminary results for a 2016 survey showed a more than 37% decline in active breeding pairs compared to 2015 (Schuckard et al. *in prep.*). There is not enough information to put this difference of inter-annual breeding and recruitment in a further context apart from the significance of the observation and potential implications for the vulnerability of this threatened species.
32. In general, few cormorants and shags live more than 10-15 years but a lifespan of at least 20-30 years in the larger species has been recorded¹⁷. Based on the total annual chick production of between 48-60 chicks, a recent population modelling of long term census data of King Shag has suggested an annual adult mortality close to 10%¹⁸.
33. Although the status of the King Shag was assessed to be stable in 2006¹⁹, many fundamental data regarding population biology are lacking to expand the 'stable' population assessment beyond a simple number. To study the species is complex and there have been concerns that King Shags are sensitive to disturbance. This has resulted in very little research on this species to date; to the extent that future conservation management is potentially hindered by a lack of knowledge of its basic biology.
34. Historic data over a 40-year period, predating my own data set, are a very important source of information and could be helpful with today's management. However, this limited and anecdotal data set with unknown confidence intervals from different observers requires caution when applied today.

¹⁵ Kennedy, M., Spencer, H. G. 2014. Classification of the cormorants of the world. *Molecular Phylogenetics and Evolution* 79 (2014) 249-257

¹⁶ Schuckard, R., Melville, D.S.M., Taylor, G.. 2015. Population and breeding census of New Zealand King Shag (*Leucocarbo carunculatus*) in 2015. *Notornis* Vol 62:209-218.

¹⁷ Nelson, J.B. *Pelicans, Cormorants and their relatives*. 2005. Oxford University Press. ISBN 0 19 857727 3

¹⁸ MacKenzie, D.I. 2014. King Shag Population Modelling and Monitoring. Proteus Wildlife Research Consultants. Report produced for King Shag Management Plan by New Zealand King Salmon.

¹⁹ Schuckard, R. 2006. Population status of the New Zealand king shag (*Leucocarbo carunculatus*). *Notornis* 53(3): 297-307.

– 13 –

35. One of the major threats of King Shag conservation management is the relict distribution and low genetic diversity²⁰.

36. For these reasons, I fully endorse the finding of the Environment Court that a presumably stable condition of a threatened species is no reason for comfort²¹:

However, when a taxon is reduced to less than 1,000 individuals on the planet, because of the risk of stochastic events, waiting for a reduction in population is no longer regarded as an appropriate trigger for protecting the taxon.

A stochastic event took place recently at the White Rock colony when 58% of all the nests of King Shags were lost to an adverse weather event between 1st June 2015 and 16th June 2015²². We are unsure if these events are part of a ‘new climate reality’, or reflect the environment the species has always been dealing with. The position of the Environment Court is consistent with the ‘unknown population trend’ of King Shag identified by International Union for Conservation of Nature and Natural Resources (IUCN). Prevention of marine farming close to the colonies and to avoid further physical and benthic footprint overlap with feeding areas is part of proposed conservation actions.

37. Policy 11 of NZCPS requires the protection of indigenous biological diversity in the coastal environment and to:

- *avoid adverse effects of activities on indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists;*
- *taxa that are listed by the IUCN as threatened;*
- *habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare;*
- *avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes;*

38. The criteria of the IUCN for threatened species has identified King Shag with 32 other New Zealand Birds as “VULNERABLE”, where this “*species is facing a high risk of extinction in the*

²⁰ Rawlence, N. J., Till, C. E., Easton, L. J., Spencer, H.G., Schuckard, R., Melville, D.S., Scofield, P., Tennyson, A. J. D., Rayner, M., Waters, J.M., Kennedy, M., Human-driven extinctions and range contraction in the endemic New Zealand King Shag complex. (*in prep.*)

²¹ *R.J. Davidson Trust v Marlborough District Council* [2016] NZEnvC 81[285]

²² Schuckard, R., Melville, D.S.M., Taylor, G.. 2015. Population and breeding census of New Zealand King Shag (*Leucocarbo carunculatus*) in 2015. *Notornis* Vol 62:209-218.

Written Comment No: 0598

– 14 –

wild in the medium-term future”. The status of this bird is based on the latest 2000 criteria of IUCN: Area of occupancy estimated to be less than 2000 km². King Shags are known to exist at no more than 9 localities within the Marlborough Sounds. The population is estimated to be less than 1000 mature individuals.

Red List IUCN	NZ threat classification	
Least Concern	Not Threatened	
Near Threatened	At Risk	<ul style="list-style-type: none"> • Naturally Uncommon • Relict • Recovering • Declining
Vulnerable	Threatened	<ul style="list-style-type: none"> • Nationally Vulnerable • Nationally Endangered • Nationally Critical
Endangered		
Critically Endangered		
Extinct in the Wild		
Extinct	Extinct	

New Zealand Threat Classification System compared with IUCN Red List. King Shag is highlighted red for both classifications.

39. Low numbers and a very small distribution area are of major concern for the survival of this species. In New Zealand, the conservation status of King Shag is Nationally Endangered based on its small population of between 250-1000 individuals²³. Duffers Reef and Trio Islands have the highest numbers of King Shags of all colonies where Duffers Reef also has the highest recruitment of all colonies.
40. A first initial feeding distribution map for New Zealand King Shag was developed after one year of monthly field surveys of the Duffers Reef colony between 1991 and 1992²⁴. The initial map with feeding distribution of birds attending the Duffers Reef colony was adopted by the Department of Conservation²⁵. King Shag feeding areas were identified by DOC to be of national importance:

²³ Miskelly, C.M.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Powlesland, R.G.; Robertson, H.A.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. (2008). Conservation status of New Zealand birds, 2008. *Notornis* 55: 117-135.

²⁴ Schuckard, R. 1994. New Zealand King Shag (*Leucocarbo carunculatus*) on Duffers Reef, Marlborough Sounds. *Notornis* 41:93-108.

²⁵ Davidson, R.J., Courtney, S.P., Millar, I.R., Brown, D.A., Deans, N.A., Clerke, P.R., Dix, J.C., Lawless, P.F., Mavor, S.J. and McRae, S.M. 1995. Ecologically important marine, freshwater, island and mainland areas from Cape Soucis to Ure River, Marlborough, New Zealand: recommendations for protection. Department of Conservation, Nelson/Marlborough Conservancy. Occasional Publication No. 16.

'Preliminary observations on King Shag feeding areas suggest that these birds target specific feeding areas/habitats only in the Marlborough Sounds. These areas are, therefore, vital for the continued survival of this endemic New Zealand shag.'

41. Whereas in 1995, feeding areas were identified to be 'vital' for the survival of the species, the '2011- Ecological Report' (referred later in paragraph 65 and 68) only identified breeding sites to be of ecological significance. The same report does not provide an assessment in support of a change of the 'vital' status of King Shag feeding areas. Combining foraging range data for spatial distribution with other information on the foraging ecology of species are fundamental for the management protocols of seabirds. Habitat preferences, oceanographic preferences, diet, and the depths, at which diving birds obtain their prey, allow for a more refined approach to delineate foraging areas that require protection. Many of these data have been collated over the years and are readily available for King Shag management in the Marlborough Sounds.
42. Area-based conservation for species is an integral part of the activities of the IUCN Species Survival Commission. This activity can be initiated in relation to the specific demands of the particular species, since protection of threatened populations requires protection of the habitat in which they occur. The threat criteria for species Red-Listing include 'extent of occurrence' and 'area of occupancy', both explicitly reflecting spatial requirements important for continued survival of species populations. The Red List term 'Area of Occupancy' is defined as:

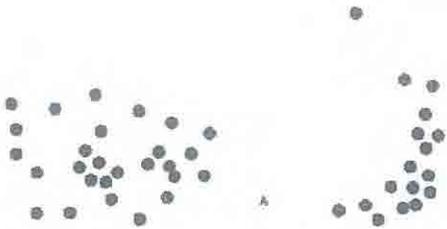
.... the area within its 'extent of occurrence' which is occupied by a taxon. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases, (e.g., irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data.

Extent of Occurrence (A)

.....is the spatial distribution of known, inferred or projected sites of occurrence.



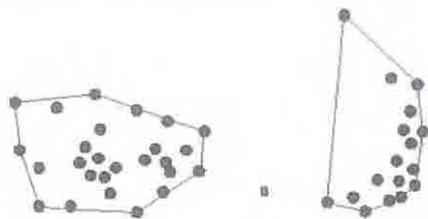
Distribution of >1000 waypoints of feeding King Shags in the Marlborough Sounds.



- 17 -

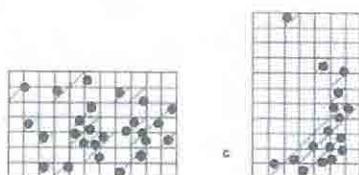
Area of Occupancy (B)

..... shows one possible boundary to the extent of occurrence, which is the measured area within this boundary.



Area of Occupancy (C)

.....shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.



607 (500m) grids containing King Shags.

43. Seaward extensions of breeding seabird colonies have been strongly promoted in the nationwide assessment for Important Bird Areas²⁶:

.....include those parts of the marine environment which are used by the colony for feeding, maintenance behaviours and social interactions'.

King Shag is one of the species for which this seaward extension is recommended.

44. The most comprehensive prey analyses used samples collected in 1991/92, from a roost at the east of Maud Island²⁷, Te Kaiangapipi. Witch (*Arnoglossus scapha*), was the most dominant prey in items and in wet mass. A further four pellets from the Trio Islands in March 1992²⁸ yielded > 20 prey items, of which only 4 were witch. This initial work from one of the breeding colonies showed a greater diversity in prey compared to the Te Kaiangapipi roost containing witch, leatherjacket (*Parika scaber*), blue cod (*Parapercis colias*) and sea perch (*Helicolenus percoides*).

²⁶ Gaskin, Ch. 2014. Important Areas for New Zealand Birds. Report prepared for Forest and Bird.

²⁷ Lalas C.; Brown, D. 1998. The diet of New Zealand King Shags (*Leucocarbo carunculatus*) in Pelorus Sound, Notornis 45: 129-139.

²⁸ Lalas unpubl. 2001, in Butler, D.J. 2003. Possible impacts of marine farming of mussels (*Perna canaliculus*) on King Shags (*Leucocarbo carunculatus*). DOC Science Internal Science Series 111.

45. Prey species for King Shag reported up to 2003²⁹ are: witch (*Arnoglossus scapha*), opalfish (*Hemerocoetes* sp), lemon sole (*Pelotretis flavilatus*), other sole species (*Peltoramphus* sp.), flounder, (*Rhombosolea* sp.), leatherjacket (*Parika scaber*), blue cod (*Parapercis colias*), sea perch (*Helicolenus percooides*), red cod (*Pseudophycis bachus*), red scorpionfish (*Scorpaena papillosus*), pilchard (*Sardinops neopilchardus*)³⁰, New Zealand sole (*Peltoramphus novaeseelandiae*), sandfish (*Gonorhynchus gonorhynchus*), triplefins (Tripteriigyea) and spotty (*Notolabrus celidotus*).
46. In 2011 five King Shag colonies in the Marlborough Sounds were visited to collect further prey information³¹. A total of seventeen species of fish were identified in the 132 pellets (regurgitations where toughest parts of prey species e.g. otoliths allow identification) from five King Shag colonies. While the list of prey species for King Shag expanded compared to what was known before, the six most common prey items were recorded in the King Shag diet previously. The prey diversity from the 2011 study is higher and represents the first sampling regime from the main colonies. These 2011 results are difficult to compare with the 1991/92 study, the latter study being of a site on the fringe of the foraging distribution of King Shag in the Waitata Reach.

²⁹ Butler, D.J. 2003. Possible impacts of marine farming of mussels (*Perna canaliculus*) on King Shags (*Leucocarbo carunculatus*). DOC Science Internal Science Series 111.

³⁰ Falla, R.A. 1933. The King Shag of Queen Charlotte Sound. The Emu:Vol. XXXIII: 44-49.

Prey of King Shag is of benthic origin, predominantly bottom dwelling fish with the exception of this paper. Falla visited the White Rocks at 25th August 1933 and it is possible that pilchards are not pelagic at that time of the year. However, the author refers to pilchard prey as "regular":
".....there is a regular seasonal occurrence of the "Picton herring" (*Sardinia neopilchardus*). The reference to substantiate this note is unknown.

³¹ Schuckard *et al.* in prep.



The six most important King Shag prey items from four colonies (*Schuckard and Melville in prep.*) compared with Lalas and Brown (1998)

47. The predominant prey from 2011 was: witch (*Arnoglossus scapha*), lemon sole (*Pelotretis flavilatus*) and opalfish (*Hemerocoetes sp.*). While witch was an important prey item, the dominance of this species was less profound on Duffers Reef and Sentinel Rock compared to the 1991/92 study. Colonies in Admiralty Bay (Trio Island and Stewart island) had witch in more than 2/3 of the pellets. Dwarf octopus (*Octopus sp.*) was recorded as new prey species in 2011.

Common name	Latin name
Witch	<i>Arnoglossus scapha</i>
Lemon Sole	<i>Pelotretis flavilatus</i>
Opalfish	<i>Percophidae</i>
Silver Conger	<i>Gnathophis habenatus</i>
Ling	<i>Genypterus blacodes</i>
Roughy	<i>Trachichthyidae</i>
Spotty	<i>Notolabrus celidotus</i>
sea perch/jock stewart	<i>Helicolenus percoides</i>
True Sole	<i>Peltorhamphus novaezeelandiae</i>
Triplefin	<i>Tripterygiidae</i>
Butterfly Perch	<i>Caesioperca lepidoptera</i>
Stargazer	<i>Uranoscopidae</i>
Stargazer	<i>Leptoscopidae</i>
Gurnard	<i>Chelidonichthys kumu</i>
Sandfish	<i>Gonorhynchus gonorhynchus</i>
Red Cod	<i>Pseudophycis bachus</i>
Javelinfish	<i>Lepidorhynchus denticulatus</i>

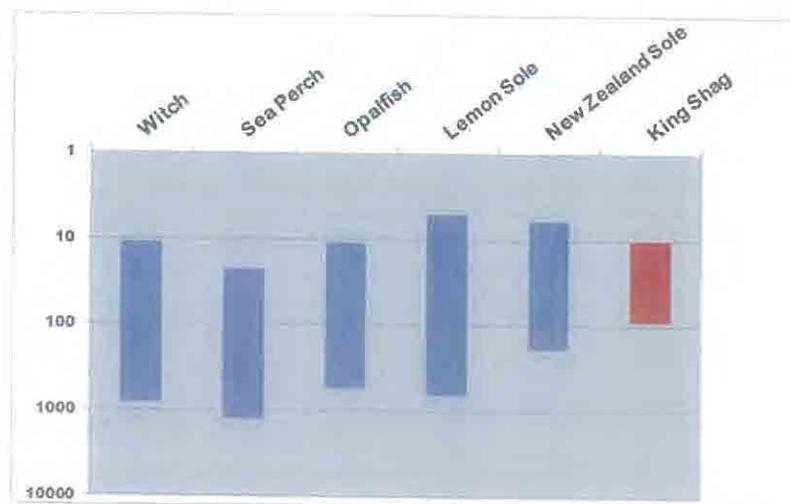
King shag prey species recorded from pellet samples during the summer of 2011³².

³² Schuckard and Melville *in prep.*

Written Comment No: 0598

- 21 -

48. Witch is also the most common species of flatfish in all New Zealand marine waters, occurring from shallow waters to depths of over 800m. All left-eyed flounders are carnivorous, usually ambushing prey of small fishes and crustaceans³³. It is not known whether King Shags target so many witch because of their apparent high density, or whether they specifically hunt for witch above other species. Both King Shag and witch are predators of organisms within the benthic and epibenthic environment in their own right, and are dependent on clear water with deep light penetration for successful foraging.
49. All the preferred prey items that have been identified to date are predominantly benthic and epibenthic species (possibly with the exception of pilchard recorded in 1932³⁴), highlighting the deep diving capabilities and dependency on the benthic and epibenthic environment in the Marlborough Sounds. The most common prey species of king shag are caught at the upper limit of their recorded depth distribution³⁵.



Most common prey species of King Shag caught in the upper limit of their depth distribution.
(Note depth log scale in metres on Y-axis.)

50. Lemon sole is the second most important prey item for King Shags from Duffers Reef, Trio Island, Stewart Island and Sentinel Rock and was also identified in the summer prey items from the King Shag roost near Maud Island. The distribution of five flatfish species has been studied

³³ Randall, J.E. 2005. Reef and Shore Fishes of the South Pacific. New Caledonia to Tahiti and the Pitcairn Islands. University of Hawai'i Press. Honolulu.

³⁴ Falla, R.A. 1933. The King Shag of Queen Charlotte Sound. The Emu: Vol. XXXXIII: 44-49.

³⁵ Anderson et al. 1998. Atlas of NZ fish and squid distributions from research bottom trawls. NIWA Tech Rep 42.

Written Comment No: 0598

– 22 –

in Wellington Harbour³⁶ of which three are known prey species for King Shag in the Marlborough Sounds. Lemon Sole and True Sole fed on benthic in-fauna and epifauna while Witch fed on benthic epifauna and pelagic organisms. Witch dominated in clear deeper water with a greater influx of oceanic water from the Cook Strait on coarser grained sediment, while Lemon Sole and New Zealand Sole were more common in shallow areas underlain by fine sediments:

*'The non-random distribution of flatfish species in the harbour may be related to sediment types and water depth or associated with distribution of prey in different sediment types'*²⁹

51. The Wellington harbour study recorded a number of families of polychaete worms of which species like *Maldanidae* were consumed by all 5 flatfish species. Seven of the polychaetes have also been recorded as in-faunal species in the Marlborough Sounds³⁷. These polychaetes occur as infaunal species in the soft bottom habitats with silt and clay. They are a food source for a number of flatfish species targeted as prey by King Shag and they are the main diet for Lemon Sole and New Zealand Sole.
52. Polychaetes dominate marine and estuarine soft bottom benthic communities in terms of numbers of species and individuals; they are critical in marine food chains, as important prey for many crustaceans, molluscs, fish, birds and other organisms, and as predators in their own right.
53. Bio-turbators like polychaetes play a major role in the breakdown, subduction and incorporation of organic matter into sediments as well as the aeration of the benthic environment. Bio-turbators recycle organic material through nitrification³⁸ and denitrification processes. Tube building polychaetes (e.g. *Maldanidae*), have been recorded to rapidly subduct freshly deposited algal carbon and inorganic materials to a depth of 10cm or more in the sediment column. They play a fundamental role in the recycling of organic material³⁹.

³⁶ Livingstone M.E. 1987. Food resource use among five flatfish species (*Pleuronectiformis*) in Wellington Harbour, New Zealand. N.Z.J.Mar.Freshw.Res.21:281-293.

³⁷ McKnight, D.G. and Grange, K.R. 1991. Macrobenthos-Sediment-Depth Relationships in Marlborough Sounds. D.O.C. Investigation No.P692.

³⁸ Nitrification is the aerobic process where bacteria change ammonia to nitrite and nitrite to nitrate. Denitrification is the anaerobic process where other bacterial species can take nitrate and change it back to nitrogen gas.

³⁹ Levin, L., Blair, N., DeMaster, D., Plaia, G., Fomes, W., Martin, C., and Thomas, C.. 1997. Rapid subduction of organic matter by maldanid polychaetes on the North Carolina slope. *Journal of Marine Research* 55:595-611.

54. Shallower redox depth⁴⁰ and higher organic matter content with a decrease (see first table underneath) in the abundances of some taxa that appear to be relatively intolerant of conditions below the farms (but increases in abundance of other species) has been recorded⁴¹. One of the taxa that became absent underneath a mussel farm compared to the control site were *Maldanidae* (see second table underneath), a very important polychaete bioturbator and prey species for a variety of flatfish.



Table 1: Sample position and sediment characteristics at grab sample stations for U990821. Positions are reported according to WGS84. 'nd' – not determined. Sample positions are shown in Figure 11.

Grab ID	Inside/Outside farm lines	Latitude	Longitude	Water Depth (m)	Redox depth (cm)	Organic Matter %	Grain size composition (%)		
							<63 µm	63-200 µm	>200 µm
1	In	40 57 676	173 57 288	21	1	6.9	77.8	7.0	15.2
2	In	40 57 674	173 57 372	21	2	7.0	91.4	7.0	1.6
3	In	40 57 722	173 57 419	24	nd	6.2	79.9	8.6	11.5
4	Out	40 57 769	173 57 341	27	8	1	87.3	12.4	0.3
5	Out	40 57 811	173 57 392	33	6	1	79.3	20.2	0.50
6	Out	40 57 820	173 57 430	40	8	1	76.8	19.2	5.01

Table 3 Numbers of animals per grab (ca 0.15 m³). See Table 1 and Figure 11 for location of samples.

Grab No	1	2	3	4	5	6
Inside/Outside mussel lines	In	In	In	Out	Out	Out
TAXON						
Phapullida						
<i>Priapulopsis australis</i>		1		1	2	
Sipuncula						
<i>Sipunculus</i> sp.		1				
Polychaeta						
Capitellidae	1		1		1	
Cirratulidae		1				
Dorvilleidae	6	1	1	7		
Eunicidae			2			
Fiabelligeridae		1		1	1	
Glyceridae	1		1	3	1	
Lumbrineridae	5	4	1	2	2	1
<i>Alciopidae</i>				1	1	1

⁴⁰ Organic enrichment of sediments usually leads to reduced conditions which equate to "bad" sediment quality, wherein natural benthic communities undergo substantial changes. The oxidation-reduction (redox) conditions in surface sediments depend on the degree of organic enrichment.

⁴¹ Brown, S., Stenton-Dozey, J., Hadfield, M., Cairney, D., 2009. Fisheries resource impact assessment for a marine farming permit application in Horse Bay, Pelorus Sound, Site U990821. NIWA Client Report:2009-039, Sanford Havelock.

Written Comment No: 0598

- 24 -

55. Occasional *Maldanidae* tubeworms communities are common and widespread if conditions are right. They are part of (and in some cases dominant aspect of) the polychaete assemblage of Blowhole North, Blowhole South, Waitata North and South, Richmond Bay and Horseshoe Bay⁴² playing an essential role in denitrification and nitrification processes that are part of the Sounds dynamics and health. A spatial concept for these communities is lacking as well as differences in abundance. A study from 1983 showed taxonomic groups that would provide for the King Shag prey species to be widespread. However, the study is not regarded as quantitative. Data from sample stations were reduced to presence/absence⁴³ and are of limited support to describe habitats of King Shag prey and King Shag feeding habitat as 'widespread'.
56. Also in overseas studies, a strong correlation was established between the occurrence of flatfish species like Plaice (*Pleuronectus platessa*) and the abundance of benthic fauna⁴⁴. In particular, infaunal tube dwelling polychaetes, a valuable food source for Plaice, dominated some of their preferred habitats.
57. A recent Environment Court decision further analyzed the effect of mussel farms on King Shag feeding habitat based on expert input. The court had⁴⁵ adequate information to find/predict that:
- (1) King Shag habitat will be changed by shell drop and sedimentation;
 - (2) the effects of the farm accumulate and are likely (*66-100% probability*) to be adverse;
and
 - (3) it is as likely as not there will be adverse effects on the populations of New Zealand King Shags and their prey;
 - (4) there is a low probability (it is very unlikely (*0-10% probability*) but possible) that the King Shag will become extinct as a result of the application, being considered in that case.
58. Mussel farms are not used by foraging King Shags but mussel boys are used as a resting place:

⁴² Brown S., Anderson T.J., Watts A., Carter M., Olsen L. and Bradley, A.. 2016 Benthic Ecological Assessments for Proposed Salmon Farm Sites. Part 1: Benthic Ecological Characterizations. NIWA Client Report No: NEL 2016-003.

⁴³ McKnight, D.G. and Grange, K.R. 1991. Macro benthos-Sediment-Depth Relationships in Marlborough Sounds. D.O.C. Investigation No. P692.

⁴⁴ Rabaut, M., Moortel, L. van de., Vincx, M. and Degraer, 2010. Biogenic reefs as structuring factor in *Pleuronectes platessa* (Plaice) nursery, Journal of Sea Research 64: 102-106.

⁴⁵ *R.J. Davidson Trust v Marlborough District Council* [2016] NZEnvC 81[206]

'....., the importance of musselfarms as foraging sites for King Shags or alternative roosting sites to land reported by Brown (2001) was not substantiated by this study.⁴⁶'

59. Based on presented evidence, the Environment Court found that King Shag forage within mussel farms only very infrequently and that a likely contributor to infrequent foraging is the reduced presence of flatfish on or in the changed seafloor underneath the farms. King Shags use of mussel farms is likely to be largely confined to resting on the buoys⁴⁷.
60. It is in the interests of resident and long-lived benthic foragers to learn to apply efficient foraging tactics throughout their lifetime and thus increase their individual foraging efficiency. Foraging efficiency of the shags through memorisation of the bottom's topography and the habits of its fauna could considerably reduce search time among marine predators by enhancing the predictability of prey location for a given individual. It is expected that this strategy is used among all benthic top predators especially by individuals of resident species⁴⁸. Foraging area fidelity is suggested for Crozet Shag (*Phalacrocorax melanogenis*) and it is acceptable to extrapolate these results to King Shag in the Marlborough Sounds as the best available information for its management in the meantime. Precaution in fully understanding the vital feeding characteristics and areas is of fundamental importance in avoiding adverse effects on threatened species like King Shag.
61. Research on Kerguelen Shag (*L. verrucosus*) provide a combined set of data of diving depth, GPS, air speed and under water speed⁴⁹, a suitable proxy for King Shag feeding behaviour. The average distance from the colony was 8.1 km with a maximum of 26km with an average diving depth of 23.4 m, an average maximum of 45.6 m and absolute maximum of 94.2m. These birds regularly rested at sea during both outbound and inbound flights without any diving, which were interpreted by the authors as necessary recuperation for the high flight energy costs. The implication of deep diving at the cost of flight performance was an important outcome of this

⁴⁶ Fisher, P.F. and Boren, L.J.. 2012. New Zealand King Shag (*Leucocarbo carunculatus*) foraging distribution and use of mussel farms in Admiralty Bay, Marlborough Sounds. Notornis Vol. 59: 105-115.

⁴⁷ *R.J.Davidson Trust v Marlborough District Council* [2016] NZEnvC 81[134]

⁴⁸ Cook, T.R., Lescroel, A., Tremblay, Y., Bost, C-A. 2008. To breathe or not to breathe? Optimal breathing, aerobic dive limit and oxygen stores in deep-diving blue-eyed shags. *Animal Behaviour*, 2008, 76: 565-576.

⁴⁹ Watanabe, Y. Y., Takahashi, A., Sato, K., Viviant, M., Bost, C-A.. 2011. Poor flight performance in deep diving cormorants. *The Journal of Experimental Biology* 214: 412-421.

Written Comment No: 0598

– 26 –

study. The average distance from the colony and the diving depth of Kerguelen Shag has similarities with choices of exploration of the feeding area by King Shag.

62. Seabirds live in a changing environment, where worldwide many are already affected by a warming climate and exposure to new anthropogenic pollutants⁵⁰. These changing circumstances may potentially affect their immune-competence, overall resilience, and as such their long term survival.
63. Parameters of survival and reproduction of a relative of King Shag, Brandt's Cormorant (*Phalacrocorax penicillatus*) deteriorated under poor environmental conditions (fish abundance, El Nino). Changes in wider environmental parameters explained their population fluctuations⁵¹. All these important conditions like population structure, environmental resilience, immune-competence etc. are missing from the conservation assessment of King Shags. In a changing marine environment, a relatively small number of King Shag is not necessarily synonymous with a secure future for the species.
64. The four main King Shag breeding colonies have protected status of 'Wildlife Sanctuary' under the Reserves Act. The significance of the feeding habitats of King Shag is recognized in the ecological maps of the current Marlborough Sounds Resource Management Plan, Appendix B: Schedule of Areas of Ecological Value. King Shag feeding habitat is assessed to be of national importance⁵².
65. A reassessment of the ecological significant sites in the Marlborough Sounds⁵³ (2011- Ecological Report) was published by Marlborough District Council and the Department of Conservation in 2011 but the status of this document remains obscure, as does its purpose. The document states that 'Greater detail about the ecology, distribution, breeding, feeding, threats and status of important species is on the Marlborough District Council's website', however the only information on King Shag appears to be Appendix B Schedule of Areas of Ecological Value (of the current Plan) which notes a number of sites, as being 'King Shag feeding habitat'.

⁵⁰ Sagerup, K., Hendriksen, E.O., Skorping, A., Skaares, J.U., Gabrielsen, G.W., 2000. Intensity of parasitic nematodes increases with organochlorine levels in the glaucous gull. *J.Appl.Ecol.*37:532-539.

⁵¹ Nur, N., Sydeman, W.J., 1999. Survival, breeding probability and reproductive success in relation to population dynamics of Brandt's Cormorant (*Phalacrocorax penicillatus*). *Bird Study* 46: 92-103.

⁵² Marlborough Sounds Resource Management Plan Volume Two – Rules, Appendix B2-3.

⁵³ Davidson, R., Duffy, C., Gaze, P., Baxter, A., DuFresne, S., Courtney, S. and Hamill, P., 2011. Ecologically Significant Marine Sites in Marlborough, New Zealand. Coordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation.

Written Comment No: 0598

- 27 -

66. Earlier evidence presented for a marine farm application (U991170) by Sandford South Island Ltd. in Orchard Bay, northeast from Duffers Reef Dr Lalas from Otago University carried out a statistical analysis of my early data on dispersion of King Shag dive sites with respect to distance from the Duffers Reef colony and to the areas of the Pelorus Sound with bottom depths between 20-40m. The halo dispersion of the shags correlates with a Poisson probability distribution. The relationship indicated that the numbers foraging increase to a peak at 6-10 kilometres flight distance from Duffers Reef and then taper off only slowly to 18 kilometres. The probability of the distribution was 'statistically highly significant ($p < 0.001$) and accounts for 90% of the recorded variation'. Dr Lalas continues: 'These results are indisputable'.
67. According to Dr Lalas' analysis, data for dispersion of foraging King Shags show that most feeding takes place between 2-12km from the colony. This is the area where the relocations of the farms in the Pelorus Sound will take place.

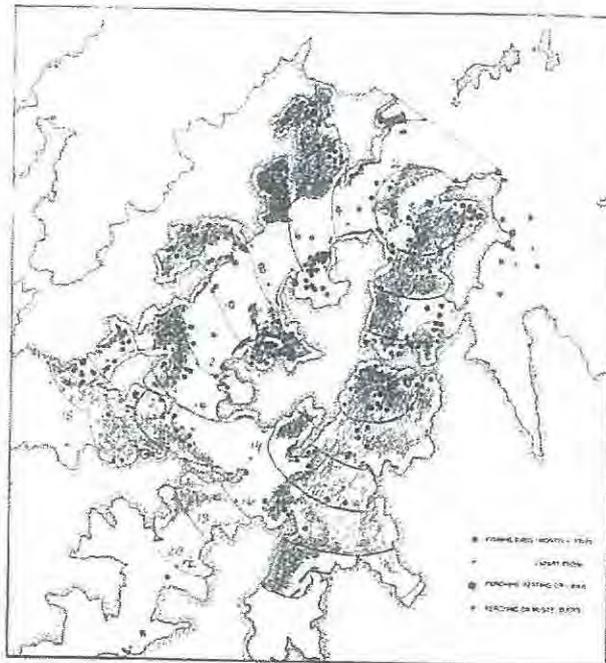


Figure 1: Dispersion of random dive sites recorded for King Shags in Pelorus Sound

Sources of map and data.

The original of this map was presented by Mr Rob Schuckard in his evidence presented at the Kuku Mara Port Ligar marine farm Council hearing in April 2000. This is the data for dispersion of dive sites from which Mr Schuckard derived his Figure 8 "Main feeding area of king shags from Duffers Reef" in Schuckard (1994).

Schuckard (1994) found that 74% of dives were in depths of 20-40 m, and so I defined as zones in Pelorus Sound in this depth range as "target habitat". I superimposed shaded areas on this map to show areas of target habitat, as derived from Navy Chart NZ 6152.

Analysis of data

Schuckard presented positions for 219 random dive sites for King Shags. The data set I used here was 231 dives. I excluded the seven dives in Guards Bay because my May 2000 surveys indicated that these were unrepresentative. (Qualitatively, I found that Guards Bay held the highest density of foraging King Shags within or adjacent Pelorus Sound). I also omitted the only dive site that was beyond 18 km flight distance from Duffers Reef.

I collated data into 2 km intervals for the shortest flying distance over water from the colony at Duffers Reef. The only exception was for birds heading south that could have flown over Piripaua Neck between Forsyth Bay and Beatrix Bay.

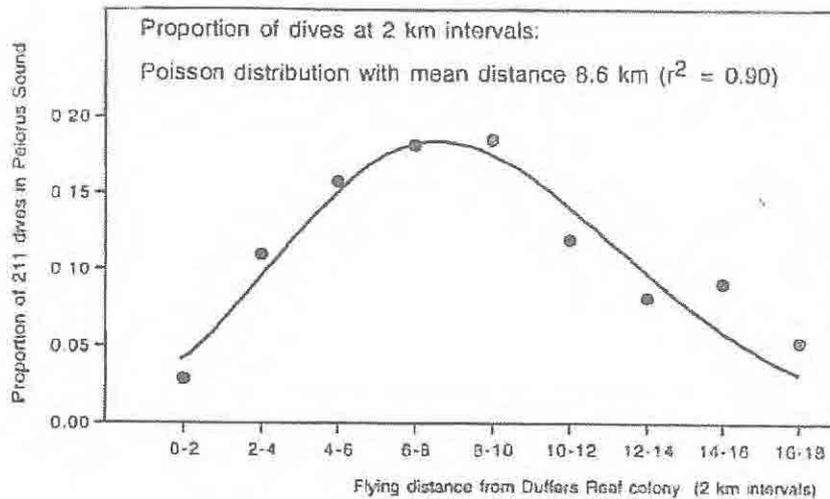


Figure 3: Graph of Poisson probability distribution curve fitted to distances flown from Duffers Reef by King Shags feeding in Pelorus Sound

Determined from data depicted in Figure 1.

The Poisson distribution is defined as $p(x) = \mu^x e^{-\mu} / x!$

where $p(x)$ = probability of a shag feeding at x km from Duffers Reef

μ = average (mean) flying distance from Duffers Reef

$e = 2.718$

The curve was calculated from transformed x values, where 0-2 km = 1; 2-4 km = 2, etc

68. The IUCN protocol for the management of threatened species does not recognize the ‘relative importance’ of areas occupied by threatened species. All feeding areas are important for the survival of the species. It is important to realize that this protocol (adopted by the NZCPS 2010) is fundamentally different from the protocol used to identify ‘Ecologically Significant Marine Sites in Marlborough, New Zealand.’⁵⁴ For birds and supposedly marine mammals the assessing team should restrain from using ‘relative importance’ of distribution area and instead use the IUCN protocol to identify ‘extent of occurrence’ and ‘area of occupancy’. Both explicitly reflect

⁵⁴ Davidson, R., Duffy, C., Gaze, P., Baxter, A., DuFresne, S., Courtney, S. and Hamill, P. 2011. Ecologically Significant Marine Sites in Marlborough, New Zealand. Coordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation.

- 30 -

spatial requirements important for continued survival of species populations. This protocol is what I have used for the purpose of the distribution maps of King Shag.

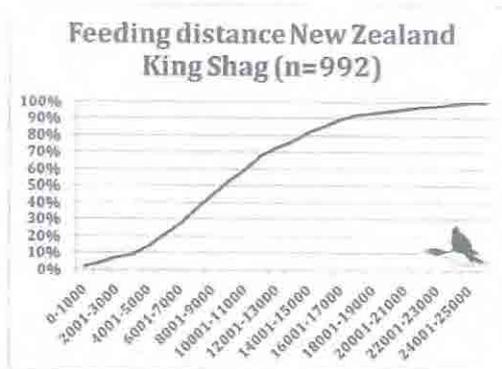
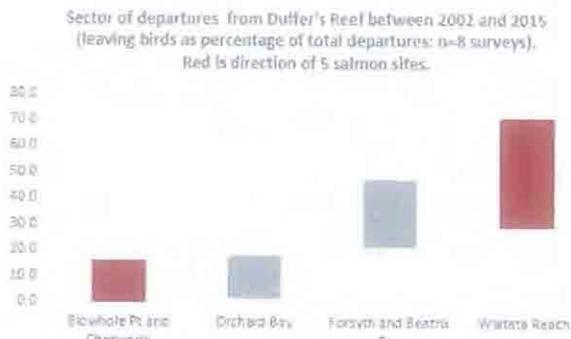
69. Cormorants belong to the “flapping species” where a high wing loading is likely related to lower energy efficiency of “flapping flight”⁵⁵. A lack of sufficient muscle power to fly at speed nearer to the most energy efficient air speed per distance flown has been suggested. Wing morphology and flight behaviour of Cormorants make them belong to those birds that have little leeway to speed up or slow down because they must flap at a rate near their maximum capability (i.e. they probably fly as fast as they can under any conditions)^{56,57}. The energy use by Cormorants to reach the feeding areas is among the highest of all seabirds and may well be an evolutionary bottleneck for the species.
70. Eight surveys between 2002 and 2015 were conducted by Duffers Reef to identify the direction of departing King Shags. These surveys started prior to the first early morning departures of the shags and lasted till at least 50% of the birds had left. Importance of survey sector was to establish the direction where most shags were feeding. Sectors with most departures were W, SW (Waitata Reach), S and SE (Forsyth and Beatrix Bay). About 74% -96% of the Duffers Reef birds forage in two distinctive directions, Forsyth and Beatrix Bay (southeast and south) and Waitata Reach (southwest and west). A slightly higher numbers of King Shags forage in the Waitata Reach (29%-71%) and its bays compared to the Forsyth Bay and Beatrix Bay directions (22%-48%).

⁵⁵ Spear, L.B.; Ainley, D.G. 1997. Flight behaviour of seabirds in relation to wind direction and wing morphology. *Ibis* 139: 221-233.
Spear, L.B.; Ainley, D.G. 1997. Flight speed of seabirds in relation to wind speed and direction. *Ibis* 139: 234-251.

⁵⁶ Pennycuik, C.J. 1987b. Flight of auks (Alcidae) and other northern sea birds compared with southern Procellariiformes: *J. Exp. Biol.* 128:335-347.

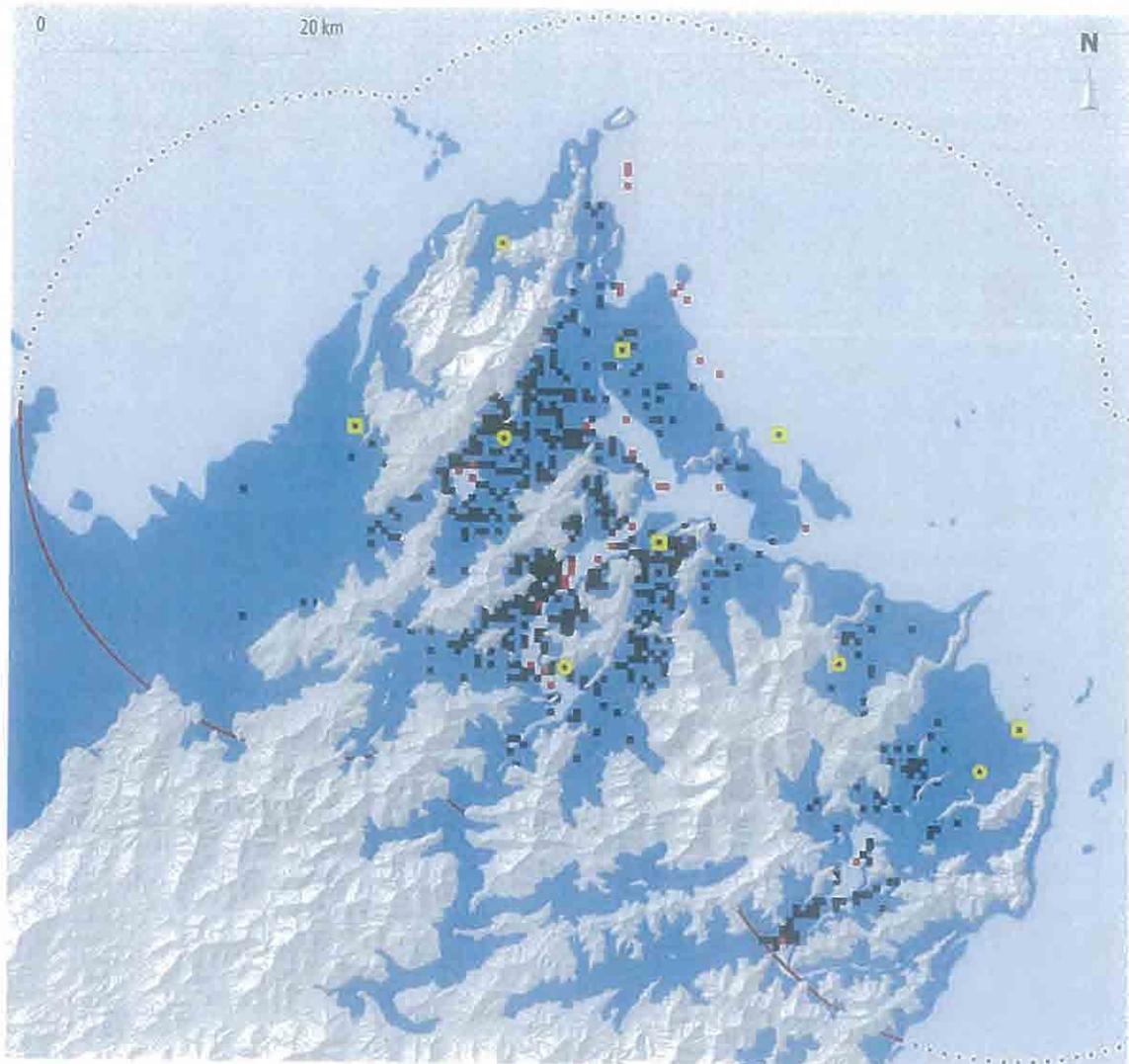
⁵⁷ Alerstam, T. & Gudmundsson, G. A. & Larsson, B. 1993. Flight tracks and speeds of Antarctic and Atlantic seabirds: Radar and optical instruments. *Phil. Trans. R. Soc. Lond. B.*:55-67

- 31 -



Feeding Direction and cumulative feeding King shags per kilometer from the colonies in the Marlborough Sounds.

71. Shags do not randomly use feeding areas, but target specific locations of the marine environment. Successive data collated since the early 1990's have provided consistency in proposed parameters of King Shags feeding in the waters of the outer Marlborough Sounds. Important feeding areas of King Shags are determined by water depth (<50m), direction from colony (predominantly between the southern and western sectors from the main colonies) and distance from the colony (maximum 25km). To date, King Shags have been recorded feeding in 607 grids (500m) with 34 grids (5%) of birds foraging in waters deeper than 50m. These parameters can be extrapolated to an area of about 1,300 km² of the Marlborough Sounds marine waters where King Shags can feed.



607 grid squares (500m) where foraging King Shags have been observed: ■ <50m, ■ >50m (5% of all grids). Red circle: 25km radius from the main colonies (>50 birds). Dark blue ≤50m: 130.000ha.

72. Distribution and diving behaviour of Great Cormorant (*Phalacrocorax carbo*) has been studied at the Chausey Islands in France⁵⁸. Here birds forage within an area of approximately 1,131 km² representing only 25% of the maximal potentially available area that birds may utilize considering their maximum foraging range of 35km. Individual birds remained within restricted individual foraging areas, on average 10-18% of the total utilized area. The preferences of each

⁵⁸ Grémillet, D.; Wilson, R.P. 1999. A life in the fast lane: energetics and foraging strategies of the great cormorant, Behavioral ecology 10: 516-524.

Written Comment No: 0598

– 33 –

cormorant not only encompass the horizontal dimensions of its feeding environment, but also the maximum depth, as individuals tend to prefer a particular depth zone.

73. Whereas spatial distribution of foraging King Shags in the Marlborough Sounds is reasonably well known, individual site fidelity to return to specific areas within their feeding range is not known. Studies on other shags however provide some useful insights into general concepts of foraging fidelity.
74. During the breeding season, the Imperial Shag (*Phalacrocorax atriceps*) in southern Argentina, had a specific foraging area distinct from other individuals. Females are more consistent than males in the maximum distance they moved from the colony and the shore, the sexes segregated in their foraging areas and individual females segregated from one another. Individuals from this colony exhibited consistency over time which is also linked to stability of the environment at the location where the colony occurs⁵⁹.
75. Individual fidelity to a particular foraging area is also suggested for the Crozet Shag (*Phalacrocorax melanogenis*). This could help increase foraging efficiency through memorisation of the bottom's topography and the habits of its fauna. Such a strategy could considerably reduce search time among marine benthic top predators (especially by individuals of resident species) by enhancing the predictability of prey location for a given individual⁶⁰.
76. Male Pelagic Cormorants (*Phalacrocorax pelagicus*) in Alaska are also faithful to one particular foraging area. Distinct, specialized foraging behavior is thought to be advantageous in reducing intra- and interspecific competition but may also render the species vulnerable to changing environmental conditions⁶¹.
77. Modelling studies of shag species has provided insight into interaction between shags and their environment. Water temperature and dive depth very much influence the energetic cost of diving but foraging parameters of shags are most strongly influenced by the availability of prey. Even a small reduction in prey density will prevent Great Cormorants meeting their daily energy

⁵⁹ Harris, S., Rey, A.R., Zavalaga, C., Quintana, F. 2014. Strong temporal consistency in the individual foraging behaviour of Imperial Shags (*Phalacrocorax atriceps*). *Ibis* 156:523-533.

⁶⁰ Cook, T.R., Cherel, Y., Tremblay, Y. 2006. Foraging tactics of chick-rearing Crozet shags: individuals display repetitive activity and diving patterns over time.

⁶¹ Kotzerka, J., Hatch, S.A., Garthe, S. 2011. Evidence for foraging site fidelity and individual foraging behaviour of Pelagic Cormorant rearing chicks in the Gulf of Alaska. *The Condor* 113: 80-88.

Written Comment No: 0598

- 34 -

requirements⁶². A reduction of prey density of only 25% resulted in an increase of search time of 50%-100%. If prey density decreases to 50%, females will fail to reach the foraging efficiency of 1.0, irrespective of temperature or diving depth. Foraging birds have to meet efficiency 1.0 to survive under given conditions. Models of the effects of environmental conditions and energy requirements on the feeding performance and distribution of European Shag (*Phalacrocorax aristotelis*) predicted that bird numbers would decline where predicted daily feeding times were high⁶³. The abundance of available prey is an important parameter for the feeding habitat of all shags.

78. Within this foraging area, 64% of the world population of 839 birds (Stewart Island [26], North Trio [173], Duffers Reef [297] and Tawhitinui [43]) feed in a relatively small subsection of their overall distribution formed by Admiralty Bay and the Pelorus Sound. It is in particular these two areas where most of the up to 3,000 ha of marine farming has occurred and where further expansion of salmon farming is now planned in the main feeding area of the King Shags from Duffers Reef. Benthic effects from mussel farms are described in general⁶⁴:

Faecal pellet and pseudofaecal production by mussels and/or oysters increases sedimentation rates under culture sites. This results in changes in sediment texture and local organic enrichment with an associated increase in oxygen consumption, increased nitrogen release rates, sulphate reduction and lowered redox potential. Increased organic loading usually results in a mildly enriched infauna. The enrichment level is generally much lower than for finfish farms, i.e. ES 2-4. Enrichment from mussels is usually limited to within 50m of farm structures.

⁶² Grémillet, D.; Wilson, R.P. 1999. A life in the fast lane: energetics and foraging strategies of the great cormorant. Behavioral ecology 10: 516-524.

⁶³ Wanless, S.; Bacon, P.J.; Harris, M.P.; Webb, A.D.; Greenstreet, S.P.R.; Webb, A. 1997. Modeling environmental and energetic effects on feeding performance and distribution of shags (*Phalacrocorax aristotelis*): integrating telemetry, geographical information systems, and modeling techniques. ICES journal of marine science 54: 524-544.

⁶⁴ Keeley, N. 2013. Literature Review of Ecological Effects of Aquaculture. Benthic Effects. Ministry of Primary Industry.

Written Comment No: 0598

- 35 -

General description and main environmental characteristics of Enrichment Stages (ES) 1 to 7 differentiated for low flow (LF) and high flow (HF) sites

ES	General description		Environmental indicators
2	Minor enrichment. Low-level enrichment. Can occur naturally or from other diffuse anthropogenic sources. "Enhanced zone".	LF	Richness usually greater than for reference conditions. Zone of "enhancement" – minor increases in abundance possible. Mainly compositional change. Sediment chemistry unaffected or with only very minor effects.
		HF	Changes as for LF.
3	Moderate enrichment. Clearly enriched and impacted. Significant community change evident.	LF	Notable abundance increase, richness and diversity usually lower than reference site. Opportunistic species (i.e. capitellid worms) begin to dominate.
		HF	As for LF.
4	High enrichment. Transitional stage between moderate effects and peak macrofauna abundance. Major community change.	LF	Diversity further reduced, abundances usually quite high, but clearly sub-peak. Opportunistic species dominate, but other taxa may still persist. Major sediment chemistry changes (approaching hypoxia).
		HF	As above, but abundance can be very high while richness and diversity are not necessarily reduced.

79. The Environment Court accepted that King Shag habitat will be changed by shell drop and sedimentation⁶⁵. Whereas musselfarms elevate the enrichment level to between ES 2-4, salmon farms when consented through monitoring regime of Best Practice Guidelines will be compliant with an enrichment level between 2.9 - 5. A significant part of the 3,000-ha marine farming in the sounds has been established in the bays along the Waitata Reach, the additional 112 ha footprint area of the salmon proposal is proposed in the most important feeding area of the King Shags from Duffers Reef. The implication of slow creep from marine farming developments, including salmon farming, on the quality of King Shag feeding areas has only been indirectly and marginally studied. All prey of King Shags are benthic species and these may well be affected by small but significant cumulative changes in marine farming areas. To accommodate these uncertainties, the Board of Inquiry allowed two more salmon farms in the Waitata Reach to be established through adaptive management.

80. Ribbon development of marine farms in the Marlborough Sounds have covered a very specific habitat along the coast subtidal slopes. I have never seen King Shags feeding in a mussel farm. I have seen them feeding between farms, near the deepest water corners of the farms. There is

⁶⁵ *R.J. Davidson Trust v Marlborough District Council* [2016] NZEnvC 81[206]

– 36 –

evidence in support of the argument that marine farms effectively exclude King Shag from feeding. This evidence consists of:

- no shags observed feeding within marine farms
- fish species from marine farms do not occur in regurgitations from King Shag; hence these fish species are either unsuitable prey or impossible to catch.

81. King Shag biology is very poorly known. The Environment Court ruled in a recent decision on this particular matter of uncertainty:

However, the prediction remains: potentially the King Shag could be driven to extinction by the accumulated and accumulative effects of mussel farms which are part of the environment in Beatrix Bay. That is a low probability event, but extinction is indubitably a significantly adverse effect which would be exacerbated, to a small extent, by the Davidson proposal⁶⁶

Board of Inquiry and King Shags

82. The Board of Inquiry (BOI) identified the implications of increased phytoplankton and consequential reduction in water clarity as potentially significant for the feeding habitat of King Shag⁶⁷. This was recognized as a matter of national importance under Part II of the Act⁶⁸ (S6c) relating to the protection of significant habitat and the presence of threatened species such as King Shag.

83. While the BOI did not expect a major shift in the trophic state of the Marlborough Sounds as a result of the proposed salmon farms, they did not rule out the possibility of shifts in the trophic state in affected embayments at different times of the year or in some years. The possibility of more subtle ecosystem changes in response to the increased nutrients from the farms was also acknowledged. The implications of increased phytoplankton and consequential reduction in water clarity was identified as potentially significant in the feeding habitat of King Shag⁶⁹. The BOI suggested that water clarity should be measured, but were reluctant to set a water clarity

⁶⁶ *R.J. Davidson Trust v Marlborough District Council* [2016] NZEnvC 81[280]

⁶⁷ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 – [431].

⁶⁸ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 – [282].

⁶⁹ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 – [431], [458].

Written Comment No: 0598

- 37 -

standard. Instead, an additional objective relating to King Shag was imposed and required monitoring of the population, in particular the colony at Duffers Reef.

84. The BOI had the greatest concern for the potential for cumulative effects within Pelorus Sound – given the number of proposed farms combined with the trends in riverine inputs, and the King Shag colony at Duffers Reef⁷⁰. The BOI identified a lack of quantification of the overall risk of the farms on King Shag but they were satisfied with the potential for adverse impacts on the feeding habitat and foraging activity of the species⁷¹.
85. The BOI identified three areas of concern that applied specifically to the Waitata Reach⁷², one of them being the ecological integrity, particularly with respect to the habitat for the King Shag:
- '...the consequences of any adverse impact on such a small population could be serious and the experts agree that King Shag may well be particularly sensitive to any habitat changes.'*⁷³
86. The BOI recommended a King Shag Management Plan as part of the conditions of consent for any farms within Pelorus Sound⁷⁴. The objective of this plan is to ensure that there is no significant decrease in the overall population and the colony at Duffers Reef.
87. A precautionary approach was required given the threatened status and limited geographic range of this species⁷⁴. The BOI decided that the siting of four proposed farms in this Reach would not be appropriate⁷⁵ where the assimilative capacity of the receiving waters and the potential cumulative effects on the foraging areas of the King Shag are uncertain.
88. The BOI appropriately applied the precautionary principle⁷⁶ and acknowledged the uncertainty regarding the King Shag in the Waitata Reach. In other instances, matters of uncertainty were mitigated by the strong proposed adaptive management conditions of consent.

⁷⁰ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [465].

⁷¹ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [532].

⁷² FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [1244].

⁷³ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [533].

⁷⁴ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [1246].

⁷⁵ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [1252].

⁷⁶ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [1278].

- 38 -

89. A King Shag Management Plan⁷⁷ was prepared. A baseline survey⁷⁸ was conducted in 2015. In the event that a statistically significant decline⁷⁹ of King Shag numbers ($p < 0.05$) is detected since the previous survey, the consent holder shall investigate whether the operation of the marine farm is causing or contributing to the decline.
90. After the initial baseline census in February 2015, the management requires a follow up count. This is planned in February 2018.

King Shag Expert Evidence of Applicant of Relocation Proposal.

91. The applicant for the Plan Change of Relocation of Six Salmon Farms in the Marlborough Sounds provided a number of reports and reviews of relevance to King Shag. They are:
- **Taylor, P. 2016. Effects of salmon farming in the Marlborough Sounds on the prey of King Shag, *Leucocarbo carunculatus*. Statfishtics.**
92. Mr. Taylor is of the opinion that the nett effect of relocations would not be significant to King Shag for the following reasons:
- The dominant prey species, representing some 90% of the King Shag diet, is a visual feeder; its own diet includes a range of epifaunal species as well as small pelagic finfish, which is an alternative to benthic foraging and is largely beyond the influence of the salmon farm.
 - Similar epifauna and infauna to that of the relocation sites is widespread within the Sounds; the total area represented by the relocation is small compared to the total area of the Sounds.
93. Mr. Taylor is over-estimating witch flounder being a dominant part of the diet of King Shags but to imply that salmon farms only have a 'benthic effect' is incorrect. An increase in phytoplankton and consequential reduction in water clarity was identified by the BOI as potentially significant for the feeding habitat of King Shag⁸⁰. Turbid conditions reduce the efficiency of prey capture

⁷⁷ Schuckard, R. 2015. King Shag Management Plan. The New Zealand King Salmon Company Ltd. Richmond and Waitata Marine Farms.

⁷⁸ Schuckard, R., Melville, D.S.M., Taylor, G.. 2015. Population and breeding census of New Zealand King Shag (*Leucocarbo carunculatus*) in 2015.

⁷⁹ MacKenzie, D.I.. 2014. King Shag Population Modeling and Monitoring. Proteus Wildlife Research Consultants. September 2014.

⁸⁰ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY - 22 February 2013 - [458].

Written Comment No: 0598

– 39 –

and prey selection by visual feeding flatfish⁸¹. The dominance of witch diet were crustaceans (*Periclimenes yaldwyni*) and anchovy (*Engraulis australis*), two prey species from the pelagic environment. Mr. Taylor has suggested a prey switch of King Shag diet from a diverse diet (20-50 years ago) to a predominant witch flounder diet recorded in a 1991/1992 study⁸². He proposes such an apparent switch of prey species to be the result of fishing pressure.

94. Earlier prey species records, predating the 1991/1992 study, are not a reflection of systematic sampling regimes. Some of these earlier records could be linked to particular colonies (e.g. Falla 1933) other reports do not mention the origin of the prey species identified at all (e.g. Nelson 1971). The interpretation of feed samples away from the main roost sites while on the edge of the main feeding distribution can provide a skewed interpretation of the diet of King Shag⁸³.
95. Whether the 1991/1992 study provides a sample of King Shag prey that is representative for the wider Pelorus Sound or for King Shag in general, is questioned. Our own 2011 samples from Duffers Reef and three other colonies identified a higher variety of prey on colonies compared to the 1991/92 study, more resembling the diversity of prey species from the earlier records. Feeding areas of King Shags in the Pelorus Sound need to be recognized until we have a better understanding how King Shag is utilizing its environment. The maintenance of the CMZ1 (aquaculture prohibited) is fundamental until knowledge based decisions on the management of this threatened species are possible.
96. Mr. Taylor is correct that the taxonomic groups of infaunal and epifaunal species of importance to King Shag prey are widespread throughout the sounds. However, the 1983⁸⁴ survey was a quantitative analysis of presence and absence of certain taxa. E.g. *Maldanidae*, an important polychaete for all prey species of King Shag, occurred in high numbers at all proposed sites in the Pelorus Sound. Whether that means that these sites are reflecting a widespread high density of the relevant taxa in the Outer Sounds or represents a specific selection of habitat of the selected sites with high numbers of certain polychaetes is unknown. The IUCN and the IBA programme have adopted the distribution map of foraging areas for King Shags beyond what is

⁸¹ Livingstone M.E. 1987. Food resource use among five flatfish species (*Pleuronectiformis*) in Wellington Harbour, New Zealand. *N.Z.J.Mar.Freshw.Res.*21:281-293.

⁸² Laifas C.; Brown, D. 1998. The diet of New Zealand King Shags (*Leucocarbo carunculatus*) in Pelorus Sound. *Notornis* 45: 129-139.

⁸³ Butler, D.J. 2003. Possible impacts of marine farming of mussels (*Perna canaliculus*) on King Shags (*Leucocarbo carunculatus*). DOC Science Internal Science Series 111.

⁸⁴ McKnight, D.G. and Grange, K.R. 1991. Macrobenthos-Sediment-Depth Relationships in Marlborough Sounds. D.O.C. Investigation No.P692.

Written Comment No: 0598

– 40 –

recognized as ‘marine significant sites’, the breeding colonies. This map finds its origin in all known feeding King Shags and is determined by water depth (<50m), direction from colony (predominantly between the southern and western sectors from the main colonies) and distance from the colony (maximum 25km) (see par.71). These maps do not distinguish areas of high and low use for feedings shags. Because we can’t interpret the relevance and significance of ‘high and low’ feeding frequency of shags, all feeding areas should be recognized to be significant.

97. Whether lost habitat for epifauna and infaunal species from high flow sites would be ‘offset’ through the vacated sites in low flow sites, is highly speculative and unsubstantiated. Embayments communities are likely different from the Waitata Reach due to their difference in environmental dynamics. A presumed similarity of communities from undisturbed embayments and the Waitata Reach could have been tested in support of this argument. That hasn’t been done and any comfort from this proposition is speculative. The recovery of compromised sites also takes longer as suggested by Mr Taylor but can be complete after five years. Subsequent on-going benthic instability was however observed beyond five years during recovery projects⁸⁵.

- **Thompson, D. 2016. Seabirds – Potential Salmon Farm Relocations in the Marlborough Sounds – Update of Existing Report, NIWA Client Report No. 2016164WN.**

98. Dr. Thompson assessed the potential effects of relocating up to six farms. He is proposing (page 7 – 3.3) that if the number of farms stay the same compared to the current low flow farms and if ‘all other factors being similar’ the population is likely to be stable in the new farm environment. Whether a fivefold increase of salmon feed into the waters of the Marlborough Sounds, known to be significant feeding habitat for King Shags from Duffers Reef, is part of this consideration is unclear and missing from his analysis.

99. Unfortunately, Dr. Thompson has considered effects of salmon farms on feeding King Shags in Tory Channel (3.3.1 and 3.3.3), an area where to date no records of feeding shags are available apart from a roosting juvenile from Ngamahau Bay. The strong currents in the channel may possibly prevent a bottom feeder from successfully exploring this environment. I will not further comment on his findings on this particular analysis.

⁸⁵ Keeley, N. B., Macleod, C. K., Hopkins, G.A., Forrest, B.M. 2014. Spatial and temporal dynamics in macro benthos during recovery from salmon farm induced organic enrichment: When is recovery complete?. Marine Pollution Bulletin 80: 240-262.

Written Comment No: 0598

- 41 -

100. Dr. Thompson makes some observation (3.3.1) that the current Forsyth Bay farm has a similar distance to Duffers Reef compared to Blowhole North and South sites and for that reason these two proposed farms are '*highly unlikely to cause any disturbance*'. The Forsyth farm has used about 11,000 tonnes of feed between 2001 and 2015 during six productive years. The two farms by Blowhole Point are proposed for almost this same amount each year, with maximum feed level of 9,500 tonnes per annum, more than 10 times the amount of feed used for the Forsyth farm. Whether this will still fit in the analysis '*all other factors being similar*' is unclear. Both Blowhole farms are mentioned to be '*...sufficiently far from the colony to pose negligible disturbance*'. It is again unclear what threshold is being used to identify 'sufficiently far'. All areas between 2 and 12 km of certain depth are important King Shag feeding areas, including the Blowhole Point farms.

101. Three farms (Blowhole North, Blowhole South and Waitata Central) at a distance between 3-5 km from Duffers Reef are proposed to use a maximum of 16.500 tonnes of feed. As a comparison, the total feed use of all NZKS farms in the Sounds between 2013 - 2015 was about 14.000 tonnes per annum.

102. The impact of noise (3.3.2) in particular the sound of feed dispensers on King Shags is unclear. The study for the proposal⁸⁶ did not address the impact of noise underwater and how that can not only affect marine mammals but also fish and foraging birds. As aquatic and terrestrial habitats differ in their sound propagation properties, i.e. sound in water travels faster and greater distances, and attenuates less than sound in air, noise pollution in aquatic ecosystems may be more far-reaching than in terrestrial ecosystems by covering larger areas. The interplay with other environmental stressors may intensify the problems for species inhabiting noise-polluted aquatic habitats. The effects of noise underwater is poorly understood and the analysis presented on this matter by is not designed to be specific for wildlife⁸⁷:

Underwater noise has been used to prevent waterfowl from foraging, in order to reduce commercial losses of farmed molluscs⁸⁸. Very little is known about the importance of

⁸⁶ Halstead, M. 2016. Salmon Farm Relocation Noise Effects Assessment. Marshall Day Acoustics.

⁸⁷ McCluskie, A.E., Langston R.H.W. & Wilkinson N.I. Birds and wave & tidal stream energy: an ecological review. Birds and wave & tidal stream energy: an ecological review.

⁸⁸ Ross, B. P., Lien, J. & Furness, R. W. (2001) Use of underwater playback to reduce the impact of elders on mussel farms Ices Journal of Marine Science, 58, 517-524.

hearing underwater to birds and whether noise can disorientate them or adversely affect their foraging success. Marine noise and more especially vibration will potentially have a greater impact on fish, and could thus alter the distribution of fish prey around device arrays. Studies have found that noise, such as from shipping activity, can cause an avoidance or attraction in fish⁸⁹. The sensitivity of fish to noise is unknown for most species, particularly those of importance to seabirds, such as sand eel (*Ammodytes marinus*), and for those with a swim bladder, such as clupeids. Studies have found that noise, such as from shipping activity, can cause an avoidance or attraction in fish.

103. Dr Thompson has assessed that there is no information about areas of importance to King Shags as foraging locations and how these locations may change. IBA's (see par 43) and the IUCN distribution map have adopted three parameters (depth, distance and direction to colony) to explain the majority of the distribution of foraging shags recorded so far:

- 1) marine waters, at 25km from the main colonies.
- 2) at a depth of <50m
- 3) in southwestern direction from colonies.

This area is about 1,300 km². In a joint Statement for the Environment Court⁹⁰ between the two avian experts, Dr Thompson and Dr Fisher, the existence of this IBA was acknowledged and as such 'the area of importance to King Shags as foraging:

'The Marlborough Sounds IBA is defined by the seaward extensions to seabird colonies and includes coastal congregations of non-breeding seabirds. The qualifying species include: King Shag (foraging range (25km) from colony and extent of foraging depth (50m);...'

It is unfortunate this information was not communicated in Dr. Thompson's evidence.

⁸⁹ Thomsen, F., Lüdemann, K., Kafemann, R. & Piper, W. (2006) Effects of offshore wind farm noise on marine mammals and fish Biola, Hamburg

⁹⁰ Joint Statement Paul Richard Fisher & David Richard Thompson, In Environment Court ENV-2006-WLG-000057. 60, 66, 73, 81, 88, 92, 94, 97.. Appeals under s.120 of the Act between Friends of Nelson Haven and Tasman Bay Inc. (Appellant) and Marlborough District Council (Respondent). 25th May 2016.

Written Comment No: 0598

– 43 –

104. Dr Thompson acknowledges that enhanced levels of productivity may occur but predicting on how these changes may affect King Shags remains extremely difficult. I concur with his conclusion. Where a range of important issues have been identified, information for a further analysis on these issues was lacking (e.g. impact enhanced productivity, uncertainty about feeding distribution, lack of information on how wildlife respond to noise etc.). Where the increase of the production is significant (doubling total production of New Zealand King Salmon Inc.) it is surprising Dr Thompson comes to the following conclusion (3.4): *'it to be unlikely that the proposed new farm locations would affect King Shags in anything other than a negligible way.'*

105. The King Shag Management Plan was part of the requirement by the Board of Inquiry to overcome uncertainty while allowing two farms to proceed with adaptive management to a total maximum feed level of 10,000 tonnes in the Waitata Reach. That amount is now proposed to increase by 23,000 tonnes to a total of 33,000 tonnes. It seems difficult to reconcile on how King Shag information and in particular the lack of it, allows Dr Thompson to make this assessment of effect to be 'negligible'.

- **Taylor, G. 2016. Comments on the NIWA seabird reports assessing issues with relocation of salmon farms in Marlborough. Department of Conservation.**

106. It is unfortunate that Mr. Taylor is not alluding to the scarce knowledge of this threatened species, a reason why the Environment Court and the BOI decided to adopt a precautionary approach for future management of this species. Whether this precaution is reflected in a more than doubling of the feed levels in the Waitata Reach is missing from Mr. Taylor's analysis. The IUCN has adopted prevention of marine farming close to colonies and avoiding further physical and benthic footprint overlap with feeding areas. The proposal clearly contradicts this precautionary approach.

Benthic Expert Evidence of Applicant of Relocation Proposal.

- **Brown, S. 2016. Benthic Ecological Assessments for Proposed Salmon Sites. Part 1 Benthic Ecological Characterizations. NIWA Client Report No: NEL2016 -003**
- **NIWA – Benthic Ecological Assessments for Proposed Salmon Farm Sites – Part 2: Assessment of Potential Effects Dec 2016.**

Written Comment No: 0598

– 44 –

107. The assessment to test the significance of benthic environments of the proposed sites is based on results of previous studies and publications^{91, 92, 93}. Personal observations and consideration of the representativeness, rarity, distribution and functional importance of the features played a further role in the assessments. To use trigger levels for significant habitats that were developed more than 20 years ago (Davidson 1995), can be problematic when decline in abundance and diversity has been recorded.
108. With the mapping of various habitat and taxa identified at the proposed sites, notable ecological features within the wider depositional footprint may still be negatively affected by even lower levels of bio deposition according to the benthic report. With no spatial information, available about a qualitative mapping of habitats that are specific for fast flow environments, transformation of areas with scallops, brachiopods, small biogenic clumps, kelp communities, tube worm beds, hydroids, sponges etc. quantification of the perceived losses in Sounds wide environment are missing.
109. Policy 7 of the NZCPS 2010, strategic planning, requires to identify areas of the coastal environment where particular activities and forms of subdivision, use and development are inappropriate or may be inappropriate without the consideration of effects. Where monitoring of the effect of two farms in adaptive management (Waitata and Richmond) has not gone beyond the establishment of a baseline, a further decline of fast flow habitats without an understanding on how 'widespread' these ecological features are, seems not to reflect the strategic planning that is required prior to a plan change. Effects beyond the predicted primary footprint is acknowledged in the evidence and perceived as a potential risk from the relocation proposal.
110. Objective One of NZCPS-2010 requires safeguarding the integrity, form, functioning and resilience of the coastal environment and sustaining its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by:
- **protecting representative or significant natural ecosystems** and sites of biological importance and maintaining the diversity of New Zealand's indigenous coastal flora and fauna;

⁹¹ Davidson, R.J. 1995. Guideline for ecological investigations of proposed marine farm areas. Department of Conservation. Occasional Publication No.25.

⁹² McKnight, D.G. and Grange, K.R. 1991. Macrobenthos-Sediment-Depth Relationships in Marlborough Sounds. D.O.C. Investigation No.P692.

⁹³ Davidson, R., Duffy, C., Gaze, P., Baxter, A., DuFresne, S., Courtney, S., Hamill, P. 2011. Ecologically Significant Marine Sites in Marlborough, New Zealand. Marlborough District Council and Department of Conservation.

Written Comment No: 0598

- 45 -

111. The concept of representativeness first appeared in court decisions as per the Reserves Act 1977 with the following goal:⁹⁴

Ensuring, as far as possible, the survival of all indigenous species or flora and fauna, both rare and commonplace, in their natural communities and habitats and the preservation of representative samples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognizable character.

In CIV-2010-409-002466, the purpose of the representative criterion² was:

...to provide for the maintenance and persistence of biological diversity in the West Coast.

112. Without any formal protection of marine habitats in the Pelorus Sounds, the proposal is pushing ecosystem functionality to levels that is not reflecting the precaution that is required with declining biodiversity in the sounds and lack of knowledge and spatial distribution of fast flow communities.

113. The outer effect of the deposition model for the proposed farms is an enrichment stage ES3. The Best Practise Guidelines prescribe an outer effect of ES<3.0, where maintenance of the natural conditions is the industrial operational goal:

ES 3.0 corresponds to discernible 'moderate enrichment' and is a state that is unlikely to be found naturally. 'Natural' (i.e. non-farm impacted) seabed in the Marlborough Sounds from ES~1.5 to ES~2.5 (but no greater than ES 2.9). Careful reference station selection is therefore critical. The total footprint presented in the benthic reports need to be seen as a minimum but likely will be larger around the edges⁹⁵.

114. With an Outer Limit Effect of ES 3.0 the model could not exclude 'some effect from both farms on the reef community of Blowhole Point.' The effect from both Blowhole North and Blowhole South will be exacerbated if compliance with Benthic Guidelines (ES<3.0) needs to be achieved.

⁹⁴ In West Coast Regional Council versus Friends of Shearer Swamp(CIV-2010-409-002466): Reserves Act 1977, s 3(1)(b).

⁹⁵ Keeley, N. et al. 2014. Best Management Practice Guidelines for salmon farms in the Marlborough Sounds: Benthic Environmental Quality Standards and Monitoring Protocol. Final 2014.

Written Comment No: 0598

– 46 –

115. Also, the Richmond South deposition model may well have a wider deposition that can affect nearby Reef/Cobble/Kelp and Reef habitat with Shell Biogenic and Brachiopods at Horseshoe Bay.

Water quality Expert Evidence of Applicant of Relocation Proposal.

- **FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY (BOI)– 22 February 2013**
- **NIWA – Modelled water column effects on potential salmon farm relocation sites in Pelorus Sound – HAM Report 12, 18 Oct 2016.**
- **Cawthron Institute – Peer review of the Marlborough Sounds biophysical model predictions Sept 2016.**

116. The BOI made a decision in 2013 about plan changes and applications for resource consents by The New Zealand King Salmon Company Limited. The greatest concern was expressed for the potential for cumulative effects of the expansion of salmon farming [465] within Pelorus Sound:

'... ..given the number of proposed farms, the trends in riverine inputs and the King Shag colony at Duffers Reef.'

117. The baseline information was regarded to be insufficient at the time of the BOI hearing [461]. To mitigate this lack of information, their proposed consent conditions required a historical baseline of water quality conditions and further water column monitoring relevant to the enrichment status of Pelorus Sound in particular. Water column monitoring should incorporate [448]:

- nutrients (NH₄-N, NO₃-N, NO₂-N, DRP, Si, TN and TP), not cause elevation of nutrient concentrations outside the confines of established natural variation for the location and time of year, beyond 250m.
- Chlorophyll-a concentrations (water clarity)
- phytoplankton composition and biomass (i.e. diatoms vs. dinoflagellates, with no increased frequency of harmful algal blooms (HAB's) and no noxious build-up of macroalgal)
- salinity,

Written Comment No: 0598

– 47 –

- temperature,
 - turbidity
 - dissolved oxygen (not to reduce to levels that are potentially harmful to marine biota)
118. The “natural” depositional flux was identified to be **the existing baseline situation** [324] with respect to both marine and terrestrial derived sediment, including the contribution from agriculture and logging operations within the catchments, rather than a pristine environment.
119. The BOI [181] considered that, before endorsing an adaptive management approach, it would have to be satisfied that:
- (a) there will be good baseline information about the receiving environment;
 - (b) the conditions provide for effective monitoring of adverse effects using appropriate indicators;
 - (c) thresholds are set to trigger remedial action before the effects become overly damaging; and
 - (d) effects that might arise can be remedied before they become irreversible.
120. Baseline environmental studies are effectively designed to establish the environmental conditions at a site prior to any site development. Once established, these “baseline” conditions then provide a benchmark against which to monitor and manage any potential future impacts resulting from industrial operations at the site.
121. Due to the established uncertainties about water column issues, every three years the results of the wider water quality and ecosystem monitoring were to be reviewed [440] to assess trends and implications for the ecosystem, including any potential for a shift in trophic status. The Board decided that these conditions and the associated monitoring and management plans to provide: *‘a sufficiently structured, but flexible, adaptive management approach’* (Marine Environmental Monitoring and Adaptive Management Plan – MEM-AMP). The farms were obliged to operate at all times in such a way as to comply with Water Quality Standards and associated responses, for the near farm and wider-scale water column environment of Pelorus Sound.
122. The purpose of the first biophysical modelling was to predict the effects of existing and proposed mussel and finfish farms on water quality⁹⁶. **Present day/existing farms scenario** with

⁹⁶ Broekhuizen, N., Hadfield, M., Plew, D. (2015) A biophysical model for the Marlborough Sounds part 2: Pelorus Sound. National Institute of Water & Atmospheric Research Ltd, NIWA Client Report (for Marlborough District Council) CHC2014-130 (project MDC13301): 163.

Written Comment No: 0598

– 48 –

mussel farms in operation in 2010 (counted by aerial-surveys), and New Zealand King Salmon Ltd. salmon farms that operated during 2012/2013 (Waihinau Bay, Forsythe Bay, and two farms in Crail Bay) were the basis to set the original baseline as required by consent conditions by BOI.

123. The 'Approved farms as for the present day' scenario, included additional mussel and fin fish farms that have been approved or existed but were not occupied during the 2010 aerial survey. The additional salmon farms were Richmond, Waitata and Port Ligar⁹⁷ (and a small farm in Beatrix Bay).
124. To give effect to precaution to the development of the salmon farms consented by BOI, the conditions require the results of the wider water quality and ecosystem monitoring to be reviewed every three years. This is to assess trends and implications for the ecosystem, including any potential for a shift in trophic status, and to make recommendations as to management actions and/or suitable indicators for assessing the water column ecosystem. These conditions and the associated monitoring and management plans were perceived to provide⁹⁸: '*a sufficiently structured, but flexible, adaptive management approach*'.
125. The 3 consented new farms have recently all been stocked and are operational under monitoring terms of MEM-AMP: Ngamahau (U140296) – November 2015, Waitata (U140294) – January 2016 and Kopaua (Richmond) (U140295). At this stage, one annual monitoring plan has been produced for the Ngamahau farm and no reports are available from the Pelorus Sound.
126. So far, the only information available on the environmental effects of the three BOI consented farms is the biophysical model. The model's predicted effect for scenario of 'approved farms as for the present day'⁹⁹ are:
- effects induced by additional fish farming will extend through the entire Pelorus system.
 - relative to the present-day scenario, the modelling suggests that the approved additional fish and mussel farms will induce:

⁹⁷ This farm was appealed for the Environment Court and no consent was granted: KPF INVESTMENTS LIMITED and (ENV-2012-CHC-80) PELORUS WILDLIFE SANCTUARIES LIMITED, J & R BUCHANAN & H T ELKINGTON (ENV -20 12-CHC-68) Appellants MARLBOROUGH DISTRICT COUNCIL

⁹⁸ FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY – 22 February 2013 - [440]

⁹⁹ Broekhuizen, N., Hadfield, M., Plew, D. (2015) A biophysical model for the Marlborough Sounds part 2: Pelorus Sound. National Institute of Water & Atmospheric Research Ltd, NIWA Client Report (for Marlborough District Council) CHC2014-130 (project MDC13301): 163.

- i. winter-time phytoplankton biomass changes of <5% and increase slightly in the main channel of central and inner Pelorus but decline within Crail/Clova/Beatrix Bays.
 - ii. summer-time phytoplankton biomass changes of <15% at most and will increase throughout Pelorus. The greatest (but still relatively small) changes will be in the vicinities of the new fish farms (i.e., in Beatrix/Crail/Clova Bays, and around Richmond/Waitata/Port Ligar).
127. The model predicted that nutrient inputs associated with the additional fish farms are to increase summertime near-surface phytoplankton standing stocks by 5–10% relative to the existing conditions (present day/existing farms scenario). The simulated phytoplankton concentrations are higher than is the norm for New Zealand coastal waters, but they would not be higher than values that are intermittently (but fairly frequently) recorded in our coastal waters.
128. The modelers allude to some uncertainties, where field data indicate that the 'existing conditions' simulation may be over-estimating summertime near-surface phytoplankton abundance and the 'additional fish farms' scenario will also contain this embedded tendency to over-estimate.
129. The 2012 baseline was required to monitor the real-world effect of the farms that were consented, in particular the Pelorus Sound where the greatest concerns were raised for the potential cumulative effects¹⁰⁰. The proposed adaptive management in combination with a baseline survey was assessed to be sufficient to overcome the uncertainties. Of the 24,000 tonnes of salmon feed proposed in 2012 by New Zealand King Salmon for the Waitata Reach, the Board consented a maximum feed level of 10,000 to go ahead with stringent monitoring. To date no monitoring reports have been available to compare real-world effects with the model.
130. The proposal for relocating low flow farms to the Waitata Reach is asking for consent for maximum of 23,000 tonnes of feed in addition to the 10,000 tonnes consented by BOI. This approach is irreconcilable with the intentions and precaution for salmon farms consented by the BOI in 2013, a careful approach also supported by the Supreme Court decision.
131. For the biophysical model of the 2016 proposal for relocation, a new baseline was created. All currently (2016) approved mussel farms and finfish farms (Crail Bay 1, Crail Bay 2,

¹⁰⁰FINAL REPORT AND DECISION OF THE BOARD OF INQUIRY - 22 February 2013 - [465]

Written Comment No: 0598

– 50 –

Beatrix Bay, Waitata, Richmond, Waihinau & Forsyth) have now been part of a 'new baseline', the baseline₂₀₁₆. The baseline₂₀₁₆ is fundamentally different from the baseline₂₀₁₂, undermining the principles of what a baseline is about. A baseline is to provide a benchmark against which to monitor and manage any potential future impacts resulting from industrial operations at the site. Whether such a shift in baseline scenario was anticipated by the BOI (and the Supreme Court) to overcome uncertainty in environmental information to underpin sustainability of the management of the Marlborough Sounds is very doubtful.

132. Scenario 13 in the model is the closest to the total relocation proposal for Pelorus Sound. Inconsistencies in the presentation of the model occur. Where Horseshoe Bay and Waitata Mid Channel SE are according to Fig. 2-1 (page 24) not part of the scenario, Table 1-1 page 19 (farm inputs for each scenario) seem to have integrated Horseshoe Bay in the modelling as per scenario 13. As such there is confusion about the scale of scenario 13. The modelers were originally presented an 'erroneous' farm production schedule (6,672 tonnes over 18 months) for the Waitata Reach farm (existing). This figure was corrected to 8,432 tonnes. It is noted that Richmond is also provided with two production schedules. Whether this is also a correction similar to Waitata is uncertain.
133. Where the majority of the feed production schedules in Table 1-1 were integrated in the model between 1st May 2017 - 31st October 2018 (18 months) the correction for Waitata (and possibly Richmond) ran between 24th May 2012 - 6th October 2013 (16.5 months). The number of corrections and omissions (e.g. discrepancies between Fig 2-1 and Table 1-1) that took place are providing problems with interpretation of outcomes of model
134. For the new baseline and model, a number of feed inputs have been used. If Richmond Bay (5,865.6 tonnes of feed) ran for 18 months, the 12-month feed schedule will be 3,910 tonnes, only 90 tonnes less compared to the maximum consented. If Waitata Bay (8,432.4 tonnes of feed) ran for 18 months, the 12-month feed schedule will be 5,621.6 tonnes, only 380 tonnes less compared to the maximum consented. Whether these high feed levels reflect the concern from the Board of Inquiry's process with e.g. water column issues for the Waitata Reach as a result of eutrophication from salmon farming is doubtful. To integrate these high feed levels in the new baseline for the Pelorus Sound is pre-empting the outcome of adaptive management required for both Waitata and Richmond farms.

Written Comment No: 0598

- 51 -

135. Also, the levels set for a number of low flow farms for scenario 1 (the new baseline) seem to be set at levels that are too high or have been proven to be unsustainable:

- Crail Bay 1 and 2 – 18 months ~1600 tonnes, 12 months ~1100 tonnes: One of these farms has only been productive in 2010 and 2011. Conditions for these low flow farms are already mimicking what the Best Practise Guidelines want to achieve, to stay between ES 3.0 - 5.0. No information has been provided to extrapolate these conditions to a production and feed level. The feed levels for baseline₂₀₁₆ are likely not reflecting the sustainable feed protocol for these farms.
- Forsyth Bay – 18 months ~4400 tonnes, 12 months ~ 2900 tonnes. Only in 2010 and 2011 were these feed levels used in two consecutive years. The benthic environment never recovered from these levels and the farm site has been very problematic ever since. To present these feed levels in the baseline scenario seems unrealistic.
- Waihinau Bay – 18 months ~4000 tonnes, 12 months ~2700 tonnes. Since 2014, this farm is using between 1500 and 2500 tonnes. The amount used for the baseline is reflecting the upper level of feed applications and problems with management of this farm are a concern.

136. For scenario 13 (the maximum number of farms but not all of them) also reveals that uncertainties in farm feed inputs for the model occur:

- Waitata Reach – A feed input for Waitata Reach NE is provided for 18 months of ~15,758 tonnes, where Waitata Reach SW is zero. This amount seems to contradict Fig 2-1 where scenario 13 has only Waitata NE activated. If we assume that the model was using the mid Waitata Reach maximum feed levels of 7,000 tonnes, the numbers are even more problematic and confusing. The 12-month equivalent of 15,758 tonnes for 12 months is 10,505 tonnes, more than 3,000 tonnes above of what is applied for.
- Richmond Bay South – For 18 months, ~8,500 tonnes of feed is proposed, ~5,700 tonnes for 12 months. That amount of feed is unrealistic compared with the maximum of 5,000 tonnes applied for.

Written Comment No: 0598

– 52 –

- Horseshoe Bay – For 18 months, ~3,900 tonnes of feed is proposed, ~2,600 tonnes for 12 months. That amount of feed is unrealistic compared with 1,500 tonnes applied for.
- Blowhole South – For 18 months, ~8,019 tonnes of feed is proposed, ~5,300 tonnes for 12 months. This farm is applying for a maximum feed level of 5,000 tonnes.
- Blowhole North – For 18 months ~7,500 tonnes is proposed, about 5,000 tonnes in 12 months. This farm has applied for 4,500 tonnes.

137. Overall, the biophysical model presents a number of uncertainties:

- The modelers have not provided a clear rationale why the baseline₂₀₁₂ changed to a baseline₂₀₁₆. This question is fundamental to maintain trust in hydrodynamic models. The protocol to accommodate uncertainties (that were identified by the BOI to allow 10,000 tonnes of feed to proceed with adaptive management) have been put aside to accommodate an additional 23,000 tonnes of feed for this proposal No: 2017/04.
- Scenario 1, the baseline₂₀₁₆ – feed levels for existing farms are set unrealistically high in comparison with today's production levels reflecting older but existing consents.
- Discrepancies occur between Figure 2-1 (maps of farms) and Table 1-1
- Scenario 13, the maximum number of farms that are modelled – This scenario is surprisingly not modelling all the farms proposed. If not all proposed farms are incorporated, the model is missing those low flow farms that will stay active. If e.g. both Crail Bay farms will be vacated (2x 0.47 ha or ~1ha of surface structure area), the surface area is similar to e.g. Richmond South (surface structure area 0.933ha). Such a proposition would not have any environmental gains as promoted in the application, to the contrary:
 - Conditions of Crail Bay are already reflecting the Best Management Guidelines (ES 3.0-5.0)
 - These farms have not been active for at least 5 years
 - The environmental change will be from zero feed levels to maximum 5,000 tonnes.
- All new farms applied for, that are part of the scenario 13 model, have higher or extreme higher feed inputs compared to what is applied for.

– 53 –

138. It is beyond the scope of my evidence to provide a judgement on the validity of the biophysical model to measure the impact of the farm or farms that are proposed for in particular the Waitata Reach. However, major concerns have been raised and need to be addressed prior to any progress on allocating sites in fast flow areas.

139. Uncertainties about the approved farms and their impact on the overall environment of the Waitata Reach is potentially identified by the modelers (page 69):

Certainly, chlorophyll concentrations in the baseline₂₀₁₆ scenario are often greater than 3.5 mg chlorophyll m⁻³ (and even 5 mg chl m⁻³). To a small degree, this may be a result of the two newly approved farms (Waitata and Richmond) but previous modelling suggests that the model tends to over-predict chlorophyll even in the absence of these farms.

140. Chlorophyll is an important measure to model the impact of salmon farming released nutrients on the wider environment. Water clarity and turbidity are parameters that will very much affect the quality of the fast flow habitats of the Waitata Reach and as such the feeding habitat of King Shag. Significant problems for the modellers have occurred to interpret thresholds for chlorophyll:

'..whilst most offer chlorophyll thresholds, many are vague in important details (e.g., degree of spatial-temporal averaging to apply to field data before comparing measurements with thresholds, size-fraction of the phytoplankton community to consider etc.'

141. The 5mg m⁻³ threshold for chlorophyll was suggested by the Board of Inquiry to be a good indicator of a shift towards eutrophic conditions and soundly based on monitoring results to date. Five mg of chlorophyll was pointed out as a level that would affect clarity, and a level that gets exceeded periodically in some bays due to natural processes. This exceedance has not been well captured with the MDC state of the environment monitoring to date. The interim water quality standards for the BOI granted farms (Waitata, Richmond and Ngamahau) were informed by analysis by NIWA of TN and Chlorophyll-*a* levels from recent monthly monitoring results and baseline data collected for NZKS by NIWA. The interim water quality standards are <3.5mg m⁻³ for Chl-*a*; <300 mg/kg for TN; and ≥90% DO concentration 250m beyond the edge of salmon net pens.

142. To date, exceedance of Chl-a above 2.0 mg m^{-3} for Chl-a are exceptional in those stations situated in the Waitata Reach, (PLS 6 and PLS 7).

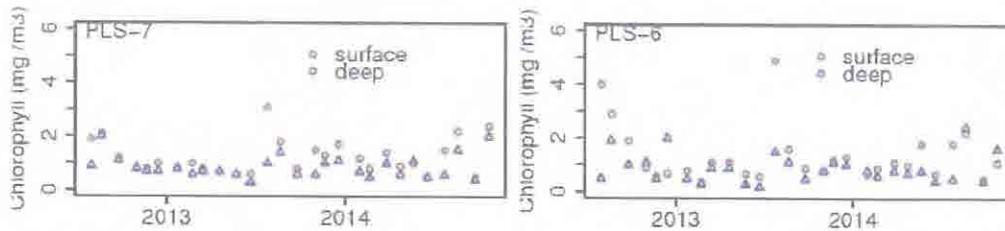


Figure 5-3: Time-series of chlorophyll-a concentrations (mg Chl-a/m^3) measured at the seven MDC stations in P

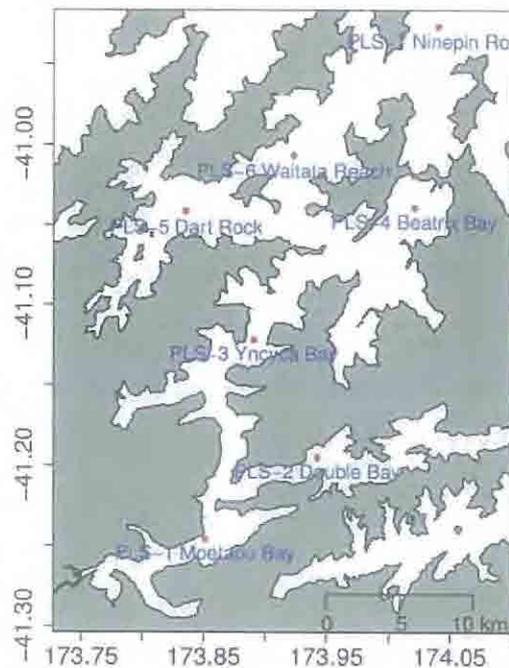


Figure 1-2: Map of Pelorus Sound showing the locations of the seven Marlborough District Council water quality monitoring sites.

143. Concerns about the shifting baseline₂₀₁₆ compared to baseline₂₀₁₂ was shared by Mr. Knight, the peer reviewer of the modelled water column effects of potential salmon farm relocation sites in Pelorus Sound. At the 3rd October 2016, Mr Knight presented a review of water quality modelling scenarios and had some initial thoughts: 'Concern that baseline was not existing scenario from 2012/2013.'

- 55 -

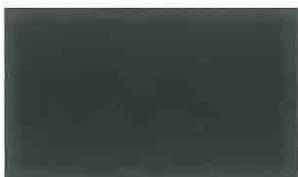
144. Mr. Knight's peer review¹⁰¹ is concerned that the responses of the model to substantial feed increases is going far beyond the levels for which they are validated: '*....there would need to be a higher standard of proof on the accuracy of the models if they are the sole method of estimating effects.*'

145. Whether Mr. Knight has incorporated all of the farms in Pelorus Sound is questioned. When (Table 2-page 6) comparing existing and proposed consented annual feed inputs for Pelorus Sound, the two BOI farms are missing from this table (4,000 and 6,000 tonnes). Whether this potential omission is further raising concerns he already was alluding to is not clear. The BOI farm Ngamahau is integrated in the feed inputs for Queen Charlotte (Table 1-page 5).

146. I agree with Mr. Knight's final conclusion (page 16):

The sensitivity of phytoplankton to additional nutrients is at the core of the model results. In my opinion, the models are being stretched beyond their original scope and purpose, particularly in the Pelorus Sound. If the models are to be used as the sole source of assessment, they will require a high level of confidence.

Rob Schuckard



A handwritten signature in black ink, appearing to be 'Rob Schuckard', written over a horizontal line.

¹⁰¹ Knight, B. 2016. Peer Review of the Marlborough Sounds Biophysical Model Predictions. Cawthron Institute - Report 2913.

Written Comment No: 0598

IN THE MATTER OF

MPI DISCUSSION PAPER NO: 2017/04

POTENTIAL RELOCATION OF SALMON FARMS
IN THE MARLBOROUGH SOUNDS – PROPOSAL
TO AMEND THE MARLBOROUGH SOUNDS
RESOURCE MANAGEMENT PLAN TO ENABLE
THE RELOCATION OF UP TO SIX EXISTING
SALMON FARMS BY REGULATIONS MADE
UNDER SECTION 360A OF THE RESOURCE
MANAGEMENT ACT 1991

STATEMENT OF EVIDENCE OF SYLVIA JEAN ALLAN

**Prepared for Friends of Nelson Haven and Tasman Bay Inc
and**

The Kenepuru and Central Sounds Residents' Association

Dated the 27th day of March 2017

Counsel: Mr J. Ironside

Wakefiled
Nelson 7095

Written Comment No: 0598

CONTENTS PAGE

INTRODUCTION	1
<i>Qualifications and Experience</i>	1
<i>Background Information</i>	3
<i>Acknowledgement of Code of Conduct</i>	4
<i>Scope of Evidence</i>	4
THE IMPLICATION AND “END POINT” OF THE PROPOSAL.....	6
THE PHYSICAL AND PLANNING CONTEXT	7
<i>General Description of the Receiving Environment</i>	8
<i>The Planning Context</i>	11
<i>The Permitted Baseline and the Existing Environment</i>	14
THE METHOD USED TO ACHIEVE THE “END POINT”	15
<i>The Basis of the RMA</i>	16
<i>Aquaculture Regulation Provisions</i>	20
<i>Appropriate Processes</i>	22
<i>The Future of the Low-Flow Site Salmon Farms without the Proposal</i>	24
<i>Precedent</i>	25
THE RELEVANT STATUTORY TESTS.....	25
<i>Does the Proposal “Have Regard To” the Regional Coastal Plan Provisions?</i>	26
<i>Are the Regulations “Necessary or Desirable” for the Management of Aquaculture Activities?</i>	27
<i>Regional or National Significance?</i>	27
<i>Effects of the Proposal</i>	28
<i>Effects on Natural Character</i>	29
<i>Effects on Landscape and Natural Feature Values</i>	30
<i>Benthic and Water Column Effects</i>	30
<i>Effects on Recreation/Tourism</i>	31
<i>Cumulative Effects</i>	31
<i>Does the Proposal Continue to Give Effect to the NZ Coastal Policy Statement?</i> 32	
<i>Does the Proposal Continue to Give Effect to the RPS?</i>	36
RMA PART 2	36
<i>Section 5</i>	37
<i>Section 6</i>	37
<i>Section 7</i>	38
<i>Section 8</i>	39
<i>Part 2 Summary</i>	39

Written Comment No: 0598

CONCLUSION FROM MY ANALYSIS	40
COMMENTARY ON POTENTIAL AMENDMENTS TO THE SOUNDS PLAN	40

INTRODUCTION

Qualifications and Experience

- 1 My name is Sylvia Jean Allan. I have a Bachelor of Science (Honours) Degree in physical geography and geology and a post-graduate Diploma in Town Planning. I am a Fellow of the New Zealand Planning Institute (NZPI) and am a former President of that professional body. I have more than 45 years experience as a planner, both in New Zealand and in the United Kingdom. I have been awarded both the first Nancy Northcroft Planning Practice Award by NZPI, and an NZPI Distinguished Service Award. I am experienced in most aspects of environmental planning. Amongst my areas of specific expertise are coastal and maritime planning.
- 2 I was initially Chair of the Legislation Committee of NZPI in the late 1980s when various legislative reviews took place which culminated in the development and introduction of the Resource Management Act 1991 (the RMA). In 1990 and 91 I was the NZPI President and also independently advising the Ministry for the Environment on aspects of the legislative reform. That experience uniquely qualified me to understand the intent and principles behind the RMA. I have continued a strong interest in the evolving legislation and practice of resource management and planning.
- 3 I am currently an independent planning consultant with my own firm, Allan Planning and Research Ltd. Amongst my clients are central government, district and regional councils, energy and communications companies, port companies, industrial and commercial organisations, community groups, and individuals. I work widely around New Zealand.
- 4 In terms of coastal and maritime experience, I provided planning advice to the port of Wellington for 23 years and the Port of Napier for 20 years. This has involved engagement in numerous coastal plan development and application processes since the late 1980s. I assisted the ports of New Zealand in their combined submission on the proposed New Zealand Coastal Policy Statement in 2008. I also assisted Nelson

Written Comment No: 0598

City and Tasman District in developing the coastal and maritime provisions in their current Resource Management Plans. I have been involved in a wide range of applications for the use and development of coastal areas, including recreational and community-based developments.

- 5 Throughout the past two decades and more I have been involved both in assisting applicants in seeking to consent aquaculture developments and associated facilities, and in opposing applications by other parties, particularly in the Marlborough Sounds but also in a range of North Island locations. I have assisted the holders of consents for large offshore marine farms in Napier and in the Bay of Plenty (offshore from Opotiki) in seeking consents to broaden the range of species able to be farmed within their consented areas. I have assisted a client with evaluating opportunities to use such space¹ for fin-fish farming, an initiative which is presently deferred.
- 6 I was also extensively involved in the appeals to the Tasman District Plan around the turn of the century on behalf of a consortium known as the SMW Group (Sealords, MacLab and Westhaven Shellfish). As part of an extended process, I was one of a small group of expert advisors who developed and provided expert evidence in relation to the concept of Aquaculture Management Areas and their inclusion in regional coastal plans, along with policies and rules relating to an adaptive management approach to such areas. These concepts were later appropriated for wider application, following the legislative Moratorium on further marine farm development. I understand the final party, Challenger Scallops, has recently withdrawn its final opposition to the Tasman District Plan proposals, so large areas in Tasman and Golden Bay are available for aquaculture development.
- 7 From this experience, I am familiar with the range of types of aquaculture and their associated effects in general terms. I am also familiar with the range of issues associated with such farming in the Marlborough Sounds environment. From the range of applications I have been involved in, I have visited most parts of the Sounds on several occasions. I have observed existing salmon farm operations at Clay Point,

¹ A zoned offshore AMA area within the relevant regional coastal plan.

Written Comment No: 0598

Otanerau Bay, Waihinau Bay and Forsyth Bay. I have also observed fin-fish farming in the Mediterranean and pond barramundi farming in Queensland.

- 8 In 2010 I provided evidence to the Environment Court in relation to ENV 2009-CHC-152, in which King Salmon Ltd sought to modify consent for an existing (undeveloped) mussel farm into a salmon farm in Waitata Reach. The appeal was successful on legal interpretive grounds² and the proposal was withdrawn. In 2012 I provided evidence to the Board of Inquiry (BoI) on the range of new salmon farms proposed by King Salmon Ltd, on behalf of Pelorus Wildlife Sanctuaries and Others, focussing on the proposed new farms in Waitata Reach. This process resulted in a plan change and consents providing for two additional salmon farms in the Pelorus Sound at sites known as Waitata and Richmond³ and one other site. In late 2014 I gave evidence in relation to an appeal on a proposal by KPF Investments, seeking to convert an existing mussel farm at Danger Point to a salmon farm. The Environment Court overturned the Marlborough Council's decision to grant a limited consent⁴. I have also recently been involved in opposing two new mussel farms in Beatrix Bay, both of which have been reviewed by the Environment Court, and one by the High Court⁵. One approval was granted and one declined.

Background Information

- 9 The evidence has been prepared in relation to the sole opportunity for public comment on a proposal by the Ministry for Primary Industries (MPI), in the guise of the Minister for Aquaculture, to use regulations under section 360A of the RMA to provide for new salmon farms ("the proposal"). It particularly focuses on the Pelorus Sound proposal, but also includes general comments relating to process which have a more generic basis. In preparing this evidence, I have reviewed the various material on the MPI consultation website "Marlborough salmon relocation". As there is a large

² Interim decision of the Environment (Dealing with Jurisdiction Issue) Decision No. [2010] NZ EnvC 411.

³ Final Report and Decision of the Board of Inquiry – New Zealand King Salmon Requests for Plan Change and Applications for Resource Consent; 22nd February 2013. The Richmond site is shown as "Kopaua" on Map 1 of the main MPI "Consultation document".

⁴ Decision No. 2014 NZEnvC 152. The original consent had been restricted to less volume of discharges of salmon food than sought.

⁵ In the latter case, ecological values and the presence of King Shag were key considerations.

Written Comment No: 0598

volume of material, I cannot confirm with confidence that I have read all the material. However, I have read most of it. In this evidence I refer to specific items as necessary.

- 10 I have also read evidence prepared by Dr Michael Steven and Mr Rob Schuckard on behalf of Friends of Nelson Haven and Tasman Bay and the Kenepuru and Central Sounds Resident's Association.

Acknowledgement of Code of Conduct

- 11 Although this evidence is not prepared for an Environment Court hearing, I have applied the Code of Conduct for Expert Witnesses in the Environment Court 2014 version⁶. Except where I state that I am relying on the evidence of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might detract from the opinions that I express in this statement of evidence.

Scope of Evidence

- 12 My evidence provides:
- the implication and “end point” of the proposal
 - the physical and planning context
 - the acceptability and appropriateness of the method chosen to achieve the “end point”
 - the relevant statutory tests (being the RMA section 360B requirements)
 - Part 2 of the RMA
 - a conclusion
 - a brief commentary on parts of the plan change.

- 13 My evidence is critical of both the process and the potential outcomes of the current endeavour to expand salmon farming in the Sounds. This is based on my

⁶ Included in the Environment Court Practice Note 2014. This is in accordance with paragraph 33 of “Information for the public wishing to make comment”, issued by the Chairperson, 7th March 2017.

Written Comment No: 0598

understanding and appreciation of the current characteristics and quality of the environment in which virtually all the new sites are proposed to be located, as well as my understanding of the techniques, environmental management, and environmental effects associated with salmon farming. It takes into account my knowledge of the available and "normal" processes for industry expansion through the RMA. It is also based on a concern about the pressures on the local communities and their advisors, and that inquiries and outcomes that appeared to be settled on the basis of an acceptable level of environmental change addressed at national level as recently as four years ago are in the process of again being challenged⁷.

- 14 Having said that, I acknowledge the additional information put forward this time, including recognition of alternative means of farming and/or seabed restoration which were not acknowledged in King Salmon's last proposal. I also acknowledge the superior cage design and management systems proposed.

- 15 I do not, however, accept the apparent underlying assumption that existing consents with associated limitations based on environmental impacts have an effective right to relocate⁸. The significant financial and support effort which has been made by MPI in association with and to the benefit of King Salmon, and the regulatory method proposed to be used, is in my opinion, out-of-kilter with the only relevant RMA national policy provision, found in the 2010 New Zealand Coastal Policy Statement (NZCPS 2010). I am concerned about the emphasis being placed on non-RMA government policy to justify the current approach. These aspects are discussed later in my evidence.

⁷ This being the third time that King Salmon has sought additional marine space for industrial purposes in Waitata Reach that I have had direct experience of.

⁸ Which is a thread which runs through the proposal document.

Written Comment No: 0598

THE IMPLICATION AND “END POINT” OF THE PROPOSAL

- 16 The intention of the proposal currently put forward for public consultation is for the Minister of Aquaculture to recommend to the Governor-General the use of regulatory powers to provide new areas zoned for salmon farming within the coastal marine area in the Marlborough Sounds. The intention is that currently consented but problematic existing farms will be relocated onto these areas, in a given priority order.
- 17 However, the proposal goes further than that. The proposal, if all sites proceed, would provide for a significant expansion in the total area – of 15.4ha, or approximately 30%⁹ – available for salmon farming. Although the surface structure area is said to be less than at present this is somewhat misleading as the two Crail Bay sites are understood not to be used, and the Forsyth Bay site (and the Waihinau Bay) site are periodically fallowed. The proposal also allows for expansion through monitored intensification of the use of the new areas within specified environmental parameters – thus providing for industry expansion in the Sounds.
- 18 The expansion proposed is very significant – particularly in relation to Waitata Reach in Pelorus Sound, where five of the six proposed new areas are located. This area already contains two of the “new” farms provided for in Coastal Marine Zone 3 by the BoI’s February 2013 decision. Only two of the four sites proposed to be relinquished are located in the vicinity of the Waitata Reach, with two more further south in Crail Bay and the remaining two at Ruakaka and Otanerau in Queen Charlotte Sound.
- 19 The BoI decision limited the two new Waitata Reach farms to a total feed capacity of 10,000 tonnes per annum. The additional feed discharge with new sites in the proposal can reach 23,000 tonnes in the Waitata Reach. Along with the transfer, this is a 4 to 5-fold intensification of activity over that associated with the low-flow sites¹⁰.

⁹ Based on a comparison of the consented low-flow sites with the new sites in the proposal, although I accept that it is intended that the statement on p6 of the proposal document which states “the amendments would ensure there is no overall increase in total surface structure area used for salmon farming in the Marlborough Sounds” also applies.

¹⁰ Information from evidence of Mr Schuckard, paragraphs i, 13.

- 20 The proposal thus provides for a somewhat larger area to that currently consented of new coastal marine space (currently used only for transport and transit, fishing and other recreation activities) to be occupied and developed for salmon farming. The sites put forward for consultation are all more prominent in their locations than those they are intended to replace. There is inevitably human activity associated with salmon farms, and this will be more intensive than at the present and more obvious in the wider Pelorus Sound.
- 21 There has always been a question as to whether salmon farming can be truly "sustainable". Unlike other farmed species in New Zealand, salmon farming relies on very significant protein inputs of fish food. The conversion of the food to saleable salmon requires high food inputs, much of which is lost as waste nutrient products. The output of nutrients into the natural environment through faeces and waste food¹¹ is very substantial. Mr Schuckard's evidence addresses this in some detail, including the equivalence in terms of nitrogen from input from human waste discharge (equivalent in this case to a medium sized New Zealand city)¹². The waste products need to be "treated" in and by the natural environment. This is clearly an issue in any partially enclosed space, and particularly when contemplating introduction or significant expansion of such activity any environment which has other recognised significant values.

THE PHYSICAL AND PLANNING CONTEXT

- 22 Looking at the cluster of five proposed new salmon farming zoned areas, along with the two new existing¹³ in the Pelorus Sound, it is clear that this area would become a substantial operational area for the salmon farming activities of the King Salmon business if the regulatory process proceeds further. Over time with intensification to the extent available, the area is likely to take on an industrial character due to the intensity of associated human activity as well as the presence of structures scattered

¹¹ I acknowledge the industry's endeavour to reduce waste, for economic as well as environmental reasons.

¹² Evidence of Mr Schuckard, paragraph 25. This is similar to my own Bol evidence, which relied on a Cawthorn Institute assessment.

¹³ And acknowledging the two to be relinquished at Waihinu Bay and Forsyth Bay assuming they are given sufficient priority or they fail and are abandoned.

Written Comment No: 0598

over the area, with intervisibility as well as visibility to all those passing through the area. Geographically, and in many other ways, this is at present a very special part of the Sounds.

General Description of the Receiving Environment

- 23 My understanding of the receiving environment is from a geographer/geologist's perspective, informed by evidence from a wide range of commentators, and with a planner's understanding of the variability of effects that are enabled by the social and planning context.
- 24 The Waitata Reach in the Outer Pelorus Sound is a strikingly-defined north-east/south-west orientated passage, some two kilometres wide between main headlands, and some 15 kilometres between the Chetwode Islands at the north and the dramatic pyramid shape of Maud Island at the south. As described and discussed by Dr Steven, this area encompasses the land-sea continuum and its character is unified by the marine environment. It would generally be perceived as a single coherent landscape character area¹⁴, including by people who traverse the area and those who live in or near to it.
- 25 This is the wide expanse of water framed by adjacent land through which craft traverse when passing between the Cook Strait and Havelock, or other locations in Pelorus Sound, Kenepuru Sound, Tennyson Inlet, Tawhitinui Reach and Beatrix and Crail Bays¹⁵. It is remote and wild.
- 26 As part of a drowned ria coastline, the area consists of numerous peninsulas and embayments, with prominent headlands, steeply sloping hillsides and a range of geomorphological features such as the very narrow promontory off Te Akaroa (also

¹⁴ Evidence of Dr Michael Steven, paragraphs 40 and 41, Figure 1.

¹⁵ Recreational and access/transport boating is readily apparent in this remote part of the Sounds. The Waitata Reach provides the only access into the Pelorus Sound.

Written Comment No: 0598

known as West Entry Point), Boat Point Rock, White Horse Rock and Yellow Cliffs at Reef Point (Kaiaua), and Maud Island itself.

- 27 The “faces” of the hills which front the Waitata Reach are generally very steep. They reach to approximately 400 metres at Te Kopi, behind Post Office Point and at the peak on Maud Island, with a more typical height being 250 metres behind White Horse Rock, Yellow Cliffs, Tapipi and The Reef. The undeveloped faces of the landforms on the north-west at present form an unmodified edge to the Waitata Reach, matched by a similar lack of development on the faces at Te Akaroa to the north and Reef Point and Maud Island each to the south, and on the south-east side of the Reach including all the facing coastline from Post Office Point to Tapipi, The Reef and Te Kaiangapi. This is a key consideration in terms of the Waitata Reach: along the main axis there is little evidence of any development. Vegetation is now changing from pasture to bush in many parts of the Reach, with a trend to higher levels of naturalness.
- 28 The old planned settlement of Bulwer lies at the end of the road from Admiralty Bay, in Waihinau Bay. This settlement consists of an historic hotel and several scattered houses. There are other small developed pockets in the embayments off Waitata Reach, but these tend to be along the sides or at the heads of bays and not visible from the main Reach.
- 29 While there are numerous marine farms in the nearby wider area, most are relatively inconspicuous in terms of the sea passage of Waitata Reach, being tucked within the embayments rather than adjacent to the main passage of the Reach. The two new salmon farms are existing anomalies in an otherwise very natural landscape.
- 30 I therefore agree with Dr Steven’s evidence on landscape values in the Waitata Reach, including his criticisms of Mr Hudson’s landscape assessment and the preceding Boffa Miskell Ltd landscape assessments¹⁶. I agree with Dr Steven that the Waitata Reach

¹⁶ Boffa Miskell Ltd were also the primary planning consultants to King Salmon Ltd assisting with the private plan change introducing the CZM3 zone.

Written Comment No: 0598

landscape is an outstanding natural landscape, worthy of identification and protection in terms of the NZCPS Policy 15a¹⁷.

31. The natural character of Waitata Reach also puts it at the outstanding end of the spectrum. Natural character values encompass aspects of an area that are not picked up in landscape evaluations and require a more holistic approach and understanding of an area than the essentially visual and experiential analysis undertaken for landscape assessment¹⁸. Dr Steven similarly recognises the limitations of expertise which have been applied in the natural character assessments of the Waitata Reach¹⁹ and criticises the Boffa Miskell, Hudson and Williams assessments accordingly.
32. Dr Steven notes the findings of the BoI which found the Waitata Reach to be an area of high natural character values, approaching outstanding in some areas, and therefore subject to NZCPS Policy 13²⁰.
33. Water quality is a key consideration in sub-surface natural character. Water quality is understood to be high and is not greatly adversely affected by runoff from land-based activities, although the King Salmon farming activities will now be having some impact. Any contaminants from, for example, activities in the river systems that enter the Pelorus system have usually reached background level by the time they reach the Waitata Reach (despite lower salinity than throughout much of the Sounds), although flood events do result in temporary water quality variations. Suspended solids are deposited in Beatrix Bay, "resulting in clear water" as the fresh water moves towards Maud Island and into the outer Sound. Effects of the older existing salmon farms at Waihinau and Forsyth Bay on water quality, while known to be obvious locally within the bays themselves from monitoring reports and observation (despite the two sites

¹⁷ I note Dr Steven's acknowledgement that even if deemed not outstanding, such natural coastal landscapes require protection in terms of NZCPS Policy 15(b).

¹⁸ Natural character evaluation has been largely appropriated by landscape architects in New Zealand, but in coastal areas equally require an understanding of what lies beneath the water's surface (as first noted in the Environment Court's decision on a Kukumara mid-bay application in the Sounds).

¹⁹ Dr Steven's evidence, paragraph 119.

²⁰ Dr Steven's evidence, paragraph 127 and 128.

Written Comment No: 0598

being used intermittently and otherwise fallowed to allow for benthic recovery), appear not at present to affect water quality more widely throughout the Reach²¹.

- 34 Similarly, the descriptions of the seabed biota and pelagic communities accompanying the consultative document in the Waitata Reach indicates relatively little modification from what could be described as natural state in this area²².
- 35 The area is thus one of at least high natural character, both above and below the water surface.
- 36 It is clear that the proposal is of great significance in an area that is still largely natural, that is an important gateway to the Sounds, and is a treasured landscape with high values.

The Planning Context

- 37 The operative Marlborough Regional Policy Statement (**RPS**) and Marlborough Sounds Resource Management Plan (**the Sounds Plan**) apply to the Sounds area. These were made operative in 1995 and 2003 (the latter fully operative 2011) respectively. Both have been subject to changes over the years, through RMA First Schedule processes.
- 38 The Proposed Marlborough Environment Plan (**the Proposed Plan**), incorporating the Proposed Regional Policy Statement, was publicly notified in May 2016. Submissions closed on September 2016. This does not yet include provisions relating to marine farming, which are still subject to review. The Council's website advises that *"in the meantime, the existing aquaculture planning provisions of the Marlborough Sounds Resource Management Plan and the Wairau/Awatere Resource Management Plan remain in place"*. At present, there is a single Coastal Marine Zone shown in the Proposed Plan.

²¹ Comment from King Salmon BoI AEE (Appendix 5).

²² I acknowledge the effects of fishing which have led to specific restrictions on blue cod fishing, and the current ban on blue cod fishing around Maud Island, as well as the Sounds closure to scallop fishing (see MPI website, Challenger area fishing rules). Fish stocks and benthic areas are not in a completely natural state at the scale of individual Sounds.

Written Comment No: 0598

- 39 In accordance with RMA section 86B, some rule provisions have legal effect. The objectives and policies have some weight when a resource consent application is being considered. However, as submissions have not yet been heard and no decisions made, the weight placed on any part of the Proposed RPS and Proposed Plan must be small.
- 40 The RPS and Sounds Plan remain the primary RMA documents providing the policy context and permitted baseline (against which effects are measured). They are currently the “settled” provisions on which the community can rely, although currently subject to comprehensive and integrated review through RMA First Schedule processes.
- 41 The Sounds Plan originally identified two Coastal Marine Zones – Coastal Marine 1 (CMZ1) and Coastal Marine 2 (CMZ2). The plan change process completed in 2013 introduced a third, CMZ3, zone specifically for salmon farming. The eventual effect was that just two additional areas in the Waitata Reach of Pelorus Sound, were added to the Sounds Plan.
- 42 Section 9.2.2, Methods of Implementation, of the Sounds Plan states:
“In Coastal Marine Zone 1 the Plan identifies those areas where marine farms are prohibited in accordance with Policies 9.2.1.1.1 and 9.2.1.1.6²³. These areas are identified as being where marine farming will have a significant adverse effect on navigational safety, recreational opportunities, natural character, ecological systems, or cultural, residential or amenity values”.
- 43 The sites identified in the proposal fall into the coastal zones shown in the table on the following page:

²³ These policy references are to policies which require the avoidance, remedy or mitigation of the use and development of coastal marine resources on specified characteristics and qualities. Policy 9.2.1.1.6 is specific to Queen Charlotte Sound.

Written Comment No: 0598

No.	Name	Zoning	Plan Notations
1	Blowhole Point North	CMZ1	Proximity to an ecological area of regional significance (1/12) – high density of burrowing tube anemone.
2	Blowhole Point South	CMZ1/CMZ2	Overlaps with a King Shag feeding area (1/11)*.
3	Mid-Channel Waitata	CMZ1	Appears to overlap in part with a King Shag feeding area (1/11)
4	Richmond Bay South	CMZ1	Proximity to a King Shag feeding area (1/11).
5	Horseshoe Bay	CMZ2	Overlaps with an ecological area buffer zone for King Shag breeding and roosting site.
6	Tio Point, Oyster Bay	CMZ1/CMZ2	–

*All King Shag sites are identified as nationally significant.

- 44 In the CMZ1 areas, applications could not be made to establish salmon farming, or any other type of marine farming (although plan change requests could be made). In the CMZ2 zones, the salmon farms in the proposal would be fully discretionary because of their somewhat offshore locations. The CMZ3 areas are specifically set aside for salmon farming in the same way as is proposed for the additional six sites of the proposal.
- 45 Some of the areas 1 to 6 in the table above are close to areas of outstanding landscapes on the Sounds Plan maps, particularly the mid-channel Waitata Reach site which lies between two “outstanding” promontories. Further natural character qualities in proximity to the proposal’s new salmon farming areas are indicated in the Sounds Plan maps, with several king shag breeding, roosting and feeding areas identified across the points, bays and the main Reach area²⁴, and an offshore rocky reef colony with a high degree of natural character²⁵ around the centre of the Reach at Keep Clear Rock.

²⁴ See Map 68 and Appendix B, Vol 2 RMP.

²⁵ High species diversity and abundance, Appendix B, Vol 2, RMP.

Written Comment No: 0598

The Permitted Baseline and the Existing Environment

- 46 The “permitted baseline” may (and in my opinion, should) be taken as a starting point for any assessment of the implications of a proposal. On this basis, any assessment should commence taking into account the environment as it exists at present, as marine farms are either prohibited, fully discretionary or non-complying within the Waitata Reach and no permitted activity has the characteristics or effects of a salmon farm, including permanence²⁶, presence of structures, scale and occupancy.
- 47 Since the Hawthorn decision²⁷, there has been guidance through case law in interpreting practice relating to the existing environment. My understanding is that the existing environment against which the impact of an activity which is sought to be approved should include the effects of activities which have been granted consent and which have not yet been established but which are likely to be established.
- 48 The main stretch of the Waitata Reach has two approved salmon farms – the sites now known as Waitata and Kopaua. Adjacent to White Horse Rock (and slightly overlapped by the Waitata salmon farm) there was a 2.2 hectare consented mussel farm which has never been established²⁸. Since the BoI decision, this has effectively been cancelled.
- 49 Near Reef Point are further potential farm sites for very low-key activities (sponges and possibly spat catching). Two have been declined and one consented. All are subject to appeal. I am unable to speculate on the outcomes, and thus whether these farms would be part of the existing environment. If they do, they are sufficiently low-key to have little effect on natural character or landscape values of the Waitata Reach as a whole.

²⁶ As compared to the transitory nature of permitted activities in the coastal marine area.

²⁷ Queenstown Lakes DC vs Hawthorn Estates (2006) NZRMA 424 CA.

²⁸ It has a 20 year duration, but would normally have lapsed some time ago but for the implications of the various aquaculture moratoria and reforming legislation. Species approved were bivalves and algae.

Written Comment No: 0598

- 50 The two salmon farms now facing the main Waitata Reach have some effects on visual, landscape and natural character, and also add nutrients to the water (subject to monitoring). Full development of the two farms over time, as approved by the BoI effectively comprises the permitted baseline. The actual and potential effects associated with these are outlined in the evidence of Dr Steven and Mr Schuckard. In summary, both somewhat reduce the quality of the pre-existing environment (visual, natural character), or have the potential to do so (benthic and water quality, marine species diversity).
- 51 The consents are subject to a range of limitations on feed discharge volumes, management plans and monitoring requirements which are intended to manage effects within acceptable bounds. The extent of potential effects to date, which through adaptive management can be considered to be a part of the existing environment, have not yet been confirmed because the first monitoring reports are not yet available.

THE METHOD USED TO ACHIEVE THE “END POINT”

- 52 The consultative document does not mince its words when it talks about the proposal enabling a significant expansion in salmon farming in the Marlborough Sounds. Although dressed up as a relocation proposal, with (paraphrased):
- improved environmental management through implementation of “benthic best management practice”
 - better social and cultural outcomes from more salmon farming jobs
 - better social and cultural outcomes from moving salmon farms away from areas of high complexity use²⁹
 - maintained or increased economic benefits from salmon farming,
- only expansion and intensification could result in the claimed potential benefits of 511 FTE jobs, and \$49m GDP addition.

²⁹ See Footnote 4 of the consultative document. This is a poorly explained and justified claimed benefit.

Written Comment No: 0598

- 53 Unlike land-based intensification of activities, salmon farming relies on access to and occupation of public space to operate. Like some land-based activities, it will discharge into public space within and beyond the boundaries of its area of occupation and reduce environmental qualities over a much wider area³⁰.
- 54 The “favour” that is being shown by central government to one industry and, indeed, are operator under the guise of the RMA is, in my experience, unprecedented. From a planning point of view, I find it incomprehensible that the government would wish to do what it is seeking to ultimately, have the Governor-General, do through the application of regulations.

The Basis of the RMA

- 55 The RMA was introduced to Parliament in 1990 as integrating legislation to manage the nation’s valued environment, including its existing natural and physical resources. It brought together all or parts of approximately 54 pre-existing statutes. The new processes it entailed were integrated, streamlined and participatory. The RMA was intended to create a “level playing field” in environmental terms. Previous legislation was variously criticised as “special purpose” or based on “picking winners”. Being in the thick of the reforms over several years in the late 1980s and early 1990s, to me there is a certain irony in the government’s current involvement in supporting an activity and an operator that has so clearly been “picked”³¹.
- 56 The RMA is legislation that has, for two and a half decades, provided a framework within which people and communities have largely been able to determine the future of their area and its natural and physical resources. The RMA has placed a light but principled management framework (through Part 2) over the top of processes at national, regional and district/territorial level through which more specific policy, methods and rules is developed. The inquiry through processes and ultimately the law

³⁰ Similar to industrial/urban discharges to air and water, and to agricultural discharges to air, land and water.

³¹ The nearest thing in the RMA to “picking winners” was the separate method through designations for network utilities (extended later to other public and Crown and local government works and developments). This was on the basis of it being essential public and economic infrastructure which needed to be able to join up across private and public space.

Written Comment No: 0598

enabled operative plan provisions to give communities a level of certainty to operate within, but also opportunities to depart, innovate and change the established frameworks. There have been numerous changes to the RMA through amending legislation, but the fundamental principles and approaches of the RMA have remained in place.

- 57 Aquaculture has always been somewhat problematic, largely because of the parallel fishing legislation but also because it occurs in the coastal marine area and has effects that can be significant. It is fair to say that inter-industry squabbling³², aquaculture industry participation in something akin to a land grab³³, and the significance of Māori interests in the coastal marine area, have resulted in national-level responses which, in my opinion, have not always been appropriate. The RMA has been subject to lurches in approach (through statutory modification) which may have frustrated sound decision-making over the years. In my observation, the RMA processes were robust enough for sound decisions on aquaculture to have been made without such changes.
- 58 The schema of the RMA provides for:
- national guidance (through National Policy Statements (NPS) of which there are now five, including the NZCPS)
 - national environmental standards under RMA section 43 and 360 (of which there are also now five).

These policies and standards are all nationally-based.

- 59 The purposes of NPSs are prescribed in RMA section 45, they are then scoped through defined processes, approved and Gazetted, and require interpretation at regional and district/territorial level. National Environmental Standards are brought in by regulation and are limited in scope to actual standards³⁴ and classification methodologies.

³² Through legal processes – such as Challenger Scallop's ability to cause long-term delays to Tasman District's plan provisions, and numerous appeals on specific proposals. Now largely resolved by the trade competition limitations.

³³ Resulting in the Moratorium.

³⁴ Qualitative and/or quantitative technical standards.

Written Comment No: 0598

- 60 The processes for developing and formalising a NPS are specified in RMA sections 46 to 54, or for a NZCPS, in RMA sections 56 to 58. NPSs require a BoI process or an alternative process which meets similar requirements. National Environmental Standards, being more technical and specific, have lesser consultation and submission standards but nevertheless must meet the requirements of RMA section 44.
- 61 When the RMA was first implemented, there was a less clear policy flow from NPS to RPSs, and from RPSs to regional and district plans than now applies. Now RPSs must give effect to NPSs (RMA section 62(3)), as must all regional and district plans (RMA sections 67(3) and 75(3))³⁵. Regional and district plans must also give effect to RPSs through the same RMA sections. The Supreme Court's King Salmon decision³⁶ describes this policy flow, and emphasises the importance of the requirement in plans to "give effect" to higher policy provisions³⁷. Higher policy provisions are worked out and implemented at regional and local level through the integrated and participatory plan development process, including processes that have access to the special expertise of the Environment Court³⁸.
- 62 Within this clear policy schema, there is one RMA-related NPS dealing with aquaculture – the NZCPS (2010). The introductory statement (p7) to the NZCPS requires local authorities to amend RMA policy statements and plans to give effect to its provisions "*as soon as practicable, using the process set out in Schedule 1 of the Act except where this NZCPS directs otherwise*". Policy 8 relates specifically to aquaculture³⁹. Policy 6, relating to activities in the coastal environment, is broader, but also addresses matters which are relevant to aquaculture. However, these sit alongside specific protectionist policies such as Policy 11 (indigenous biological diversity), Policies 13 and 14 (protection and restoration of natural character), Policy 15 (natural features and landscapes), Policy 21 (enhancement of water quality), and

³⁵ This change was made precisely because the policy flow was not being achieved under the earlier "consistent with" wording.

³⁶ SC82/2013 [2014]NZCS 38

³⁷ A more recent High Court decision has made similar comments in relation to the National Policy Statement on Electricity Transmission.

³⁸ And higher Courts on points of law.

³⁹ In this it differs from the previous NZCPS (1994) which was silent on aquaculture.

Written Comment No: 0598

Policy 23 (discharges of contaminants). They also sit alongside process policies such as Policy 3 (precautionary approach), Policy 4 (integration) and Policy 7 (strategic planning).

- 63 In contrast to the policy driven approaches, the RMA contains opportunities for any person to seek to change a regional or district plan (First Schedule Part 2). Any Minister can seek a change to a RPS. These provisions were always part of the RMA and were intended to allow for flexibility and to test provisions when local authorities were slow or intransigent.
- 64 Although there were call-in procedures for matters of national significance from the commencement of the RMA, these were substantially boosted in 2009 when Part 6AA was added. These provide the ability for the Minister for the Environment to identify key nationally-significant projects or proposals and have them addressed by the EPA through an appropriate process. This route was used for the King Salmon plan change request in 2011.
- 65 Looking at the schema of the RMA, it is apparent that it is intended to be policy driven from national level downwards, and there are opportunities for a wide range of people to both take part in normal processes, and to initiate processes themselves when they feel a change is needed. Crown Ministers have additional rights as they can initiate national and regional policy. The Minister of Conservation has always had a key role and responsibilities in the coastal environment.
- 66 Regulatory powers are extensively provided for in the RMA. They provide for “nuts and bolts” provisions as an inspection of section 360 and the regulations to date themselves reveal⁴⁰. Generally the regulation powers apply to the Minister for the Environment, but the Minister of Conservation and of Transport may also have roles. The matters of general regulations are quite prescribed⁴¹. Under section 360, it would seem to be impossible for the Minister to zone specific areas for specific activities or

⁴⁰ Such as the marine pollution regulations, water take measurement requirements, forms and fees.

⁴¹ In my opinion, there are some opportunities for an overlap with national environmental standards, but not with provisions that would normally be developed through First Schedule processes.

Written Comment No: 0598

to bypass the other available processes in the RMA except for prosaic matters. In relation to the coastal marine area, the powers include “deeming” provisions to include matters in regional coastal plans across a relatively narrow pollution-related set of provisions⁴².

- 67 Currently, the Ministry for the Environment’s website⁴³ on National Directions indicates that it is preparing “*nationally consistent rules for coastal plans for the management of aquaculture, including simpler and more certain consenting provisions for existing farms*”. This is advice from as recently as September last year. It is expected that the provisions will be completed by Mid-2017. The tools available through this process include NPSs, NESs and regulations.

Aquaculture Regulation Provisions

- 68 Sections 360A and 360B were added to the RMA in 2011. They provide a separate “code” for regulations related to aquaculture which are specific to the Minister of Aquaculture (currently in the guise of the Minister of Primary Industries).
- 69 Although the scope for the Governor-General, acting on the advice of the Minister of Aquaculture, includes the ability to “*amend provisions in a regional coastal plan that relate to the management of aquaculture activities in the coastal marine area*”, and the Minister of Aquaculture has such functions under RMA 28B(c)⁴⁴, it could not have been expected or envisaged that this would be used to usurp the normal RMA processes to effectively rezone coastal marine areas or to allow major expansion of salmon farming as the proposal provides.
- 70 It might have been expected that the regulatory powers could have been used to develop additional safeguards for monitoring, protection, allocation between competing parties or other methods akin to the wider regulatory powers in section

⁴² See section 360(1)(ha)

⁴³ “A Way Forward for National Direction”, 2016, INFO766

Source: http://www.mfe.govt.nz/sites/default/files/media/RMA/MFE_RMA%20Nat%20Direction_Lo-Res.pdf

⁴⁴ Also added to the RMA as an entirely new section in 2011.

Written Comment No: 0598

360. The “*regional or national significance*” clause in section 360B(2)(c) does not lead to an expectation of new zoning provisions or intensive and localised allocation of areas of coastal space.
- 71 One problem is that the Minister of Aquaculture has a narrow brief in terms of section 28B of the RMA, and which does not enable him or her to form judgements in relation to, for example, the items in RMA section 360B(2)(c)(iii). A second problem is the inclusion of the reference in 360B(2)(c)(i) which is that “*the proposed regulations are necessary or desirable for the management of aquaculture activities in accordance with the Government’s policy for aquaculture in the coastal marine area*”. Nowhere else in the whole of the RMA is there unfettered ability to call on a current government policy which has not been through an RMA process⁴⁵. The consultation document on the proposal relies heavily on statements of government policy which have not been subject to RMA processes. Both these aspects raise great concern as to how the regulation provisions are proposed to be used.
- 72 There is RMA policy for aquaculture which has gone through the exacting process for a RMA NZCPS and has been included in the NZCPS which is quite inconsistent with the stated Government (non-RMA) policy used to justify the proposal. The inconsistency includes the NZCPS’s requirement that a Schedule 1 process is used to embed appropriate provisions in plans. The inconsistency also emerges in the single-purpose scope of sections 360A and B, which patently overlooks the range of other NZCPS policies which must be reconciled alongside NZCPS Policy 8. There is further inconsistency in the use of the regulatory tool, as it provides for a localised intensity of salmon farming use which seems to fly in the face of the measured approach recently and specifically developed for King Salmon through the Minister for the Environment’s call-in procedures.

⁴⁵ There is aquaculture policy within the NZCPS, particularly Policy 8, which requires that RPSs and regional coastal plans include provisions “in appropriate places” for aquaculture. This policy sits alongside, and must be reconciled through RMA processes, numerous other policy requirements. The Interpretation section of the NZCPS makes it clear that the policies are not in priority order.

Written Comment No: 0598

- 73 Finally, the Minister of Conservation, who has the important function of approving regional coastal plans (and plan changes) under RMA section 28(b) which incorporates reference to Schedule 1 processes, appears to be entirely cut out of any role through the current process. There is no cross-over between the Functions of the Minister of Aquaculture in RMA section 28B(c) and the Functions of the Minister of Conservation. This may be acceptable if the regulations are being applied to subjects and aspects to which RMA regulations are typically applied. However, when the regulation-making power is used to usurp normal Schedule 1 processes, in my opinion this leads to a fundamental problem in the integrity of the administration of the RMA.

Appropriate Processes

- 74 In my opinion the current process and proposal is a mis-use of regulatory powers. There are three types of approaches that MPI and/or King Salmon Ltd could have initiated or become involved in which would have appropriate process and adequate safeguards. These are:
- Allow and even assist the Marlborough District Council to complete the development and notification of the aquaculture provisions of its RPS and proposed Plan, and take part in the process of submissions, hearings and appeals (if necessary). At the moment I expect that the Council has made considerable progress in developing that part of the plan, but that the current process has diverted resources and distracted effort away from getting the aquaculture provisions in a suitable state for inclusion in the Plan.
 - Either the Minister or King Salmon could initiate a plan change (as the Sounds Plan is operative and more than two years has passed since the last plan change request). From that point the plan change could be determined to be a matter of national importance and sent to the EPA for processing, or could follow the normal “private plan change” process.
 - The Minister or King Salmon could limit its expansion plans to a more modest proposal and seek resource consents for sites that are not in the CMZ1 zone.

Written Comment No: 0598

- 75 I accept that plan review processes, such as are currently being undertaken by Marlborough District Council, are lengthy. However, they are inclusive and important processes, and in line with NZCPS policies, including for integration (Policy 4) as well as the RMA's direct requirements for integrated management of natural and physical resourcing and management of environmental effects. It is my opinion that it is this process that should have been followed by MPI or King Salmon, given the timing. Participation in this process could have identified appropriate new sites, and provided for "offered" relocations if requested. Rezoning of areas for new uses is quite possible through this process, as has recently been confirmed in relation to the Auckland Unitary Plan.
- 76 Such a process would provide for the integrated planning and management of effects in the context of the wider planning process that the RMA and NZCPS required. It would also involve the rigorous process and updated and "settled" outcome in relation to aspects such as natural character and landscape values of the Waitata Reach which are clearly not yet settled.
- 77 It would also involve basic RMA requirements such as a section 32 analysis. This basic evaluation against the purpose of the RMA appears to be currently missing, even in draft, from the process. The proposal as put forward certainly meets some elements of what would normally be included in a section 32 analysis, including information on the beneficial aspects of employment and economic growth, but lacks the rigor of risk assessment in *"acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions"*. This applies in relation to aspects such as water column and cumulative effects. Other plan objectives⁴⁶ cannot be reconciled against the proposal without such process.
- 78 It appears from the documentation that the Minister intends to undertake this exercise following the consultation process⁴⁷.

⁴⁶ Including those in the making under the Proposed Plan.

⁴⁷ See Cabinet paper, MPI website, last line, Appendix 6.

Written Comment No: 0598

The Future of the Low-Flow Site Salmon Farms without the Proposal

- 79 Unlike the provisions that apply to district consents, which lapse if not used for 12 months, regional consents may continue. This has allowed for fallowing and non-operation of some sites. It is my understanding that the low flow salmon farm sites all come up for renewal over the next decade. Section 17⁴⁸, however, applies and enforcements or abatement procedures have always been available, as have reviews of conditions by the Council. The greater understanding of the adverse effects of salmon farming at the low-flow sites has meant that it would be inevitable that either consents would lapse, or sooner or later some person would apply enforcement or abatement actions. These constraints have been known by both King Salmon and affected people for some time⁴⁹. The environmental constraints have also limited production of salmon due to environmental issues and fish health.
- 80 It is quite clear from the discussion document on the proposal that the benthic guidelines that apply to the new King Salmon sites are not being achieved at the low flow sites⁵⁰. It is reasonably likely that all would become uneconomic under the environmental standards that are now expected. In the normal course of events, over time these sites would close to salmon farming⁵¹. As they are part of the permitted baseline, it may be possible to replace them with other types of aquaculture that do meet environmental limits.
- 81 This process would be the normal interplay of the market and environmental management. I know of no other situations where an industry has sought and achieved assistance to the extent of new public resource being allocated by RMA regulation to overcome this 'normal' process of economic obsolescence.

⁴⁸ The duty of care to avoid, remedy or mitigate adverse effects regardless of the permissive provisions of a resource consent

⁴⁹ Such issues were raised in relation to Waihinau Bay and the initial applications for a salmon farm at White Horse Rock. They include odour, benthic and surface effects, and attraction of prey species such as sharks.

⁵⁰ See p7, for example.

⁵¹ Unless new farming methods or technologies are developed.

Precedent

- 82 With environmental limits being reached in relation to a number of economic activities in New Zealand⁵² and other emerging environmental issues such as increased coastal hazards expected to intensify in coming years, the precedent set by the current process of regulation to allow salmon farm relocation and expansion in the public realm, is likely to be considered in relation to other industries, activities or circumstances.
- 83 It is likely to be applied again when King Salmon or another operator wishes to expand in another location with environmental qualities that make it suitable for the activity in the eyes of the Minister and advisors⁵³. Some of the potential areas, particularly those in more remote locations, do not have the community to participate in a process like the current one. With the Minister of Conservation having no role beyond that of the general public, the precedent set by the current process is of considerable concern.

THE RELEVANT STATUTORY TESTS

- 84 The provisions of sections 360B require that the Minister must:
- have *“first had regard to the provisions of the regional coastal plan that will be affected by the proposed regulations”* (section 360B(2)(a))
 - be satisfied that the regulations *“are necessary or desirable for the management of aquaculture activities”* in accordance with the Government’s policy (section 360B(2)(c)(i))
 - be satisfied that the matters to be addressed are of regional or national significance (section 360B(2)(c)(ii))
 - be satisfied that the amended Sounds plan will *“continue to give effect to*
 - a) any national policy statement*
 - b) any New Zealand Coastal Policy Statement*

⁵² See OECD Environmental Performance Reviews: New Zealand 2017, March 2017.

⁵³ See my earlier comments about the narrow mandate of the Minister of Aquaculture.

Written Comment No: 0598

c) any regional policy statement" (section 360B(2)(c)(iii)).

85 My evidence now briefly comments on these matters.

Does the Proposal "Have Regard To" the Regional Coastal Plan Provisions?

86 This is a curious question to ask in relation to a rezoning proposal for salmon farming. If the regulation was for a "normal" regulatory power, one would be looking for general consistency. In this case, the proposal represents a major change in zoning, a substantial increase in activity and the associated potential to seek and obtain occupation and discharge consent components.

87 To "have regard to" has been the subject of considerable case law, but generally it can be taken to mean to "take into account" or to "respect". It is not as strong as, for example, "recognise and provide for" (section 6) or "have particular regard to" (section 7).

88 Introducing a major zoning change through regulation, particularly in areas in which the activities which the zone provides for are currently prohibited (and cannot be applied for) in my opinion does not "have regard to" the regional coastal plan. These areas are closed to such activities in the Sounds Plan. To the extent that the proposal may have taken into account other aspects of the Sounds Plan – in particular the ecological values of identified areas – again there appear to be inconsistencies sufficient for the "regard to" test to be seen to fail.

89 In my assessment there are numerous policy provisions in the Sounds Plan to which the provisions of the proposal are contrary. The proposal's response is to insert provisions, particularly rules, which effectively over-ride and ignore the application of policy in the specific locations. In my opinion, this process does not meet the "regard to" test.

Written Comment No: 0598

Are the Regulations “Necessary or Desirable” for the Management of Aquaculture Activities?

- 90 This raises again the issue of the appropriateness and acceptability of using regulations to zone areas of the coastal marine area and allow for significant expansion of one type of aquaculture activity in these specified locations. This is a general question which is being applied to a specific situation for the benefit of one aquacultural operator.
- 91 Even if a broad approach is taken, the answer to this question is clearly “no”. There are alternative methods to regulation which mean that this method is not necessary.
- 92 As to the question of whether the method may be desirable, I can see that it could be to the Minster and King Salmon, as it removes many of the rights and balances to other parties which apply through the other processes. It also potentially speeds processes. Otherwise it does not achieve anything that normal RMA processes could achieve (if sustainable in terms of Part 2 and other necessary considerations).
- 93 If the wider context of RMA government policy for aquaculture (including the NZCPS policy) is taken into account, it is not desirable to pursue the proposal in isolation and ahead of normal plan review processes. This is patently clear in terms of, for example, updated information and the importance of aspects such as natural character, landscape values and areas of ecological importance and cultural values, being addressed through integrated plan review processes.

Regional or National Significance?

- 94 King Salmon’s previous rezoning proposal initially involved nine new sites and was deemed by the Minister for the Environment to be nationally significant. In making that decision, the Minister was required to form an opinion and issue an explanation.

Written Comment No: 0598

95 Amongst all the documentation, I do not see any equivalent statement about the national or regional significance of “the matter to be addressed”. Even the Ministerial Foreword to the discussion document does not suggest that it is – rather the proposal is couched in this Foreword as one that “*is about ensuring good environmental management of salmon farms*”, and “*finding a better balance between the different values people hold in the Marlborough Sounds*”. One might ask “better than what?”. Despite this unanswered rhetorical question, these two justifications do not identify any nationally or regionally significant aspects to the proposal. In my opinion, these justifications are much better addressed through a normal planning process (plan review or plan change) although I acknowledge that regulation can be useful in determining methods and specific standards for environmental management⁵⁴.

96 There is a brief mention in Appendix 6 of the Cabinet Paper, where the Minister states that “*the environmental improvements to the seabed beneath salmon farms are of regional significance*”, and the “*economic benefits, which include potentially doubling the production of King Salmon from the same amount of space, may be of national significance*”. These are tentative statements, both of which are questionable, and which appear not to have been furthered.

Effects of the Proposal

97 An understanding of the actual and potential effects of the proposal is fundamental to an understanding of the matters to be addressed in the RMA section 360B(2)(c)(iii), and also RMA Part 2 considerations. As noted earlier, effects must be considered within the context of the permitted baseline.

98 From my review of the material available, including the evidence of Dr Steven and Mr Schuckard, I comment briefly in the following paragraphs on what I consider to be the key actual and potential effects.

⁵⁴ As applied by the Minister for the Environment to some extent under section 360.

Written Comment No: 0598

Effects on Natural Character

- 99 As can be seen from my general description of the area and in agreement with the evidence of Dr Steven and the BoI's findings, I consider the natural character values of the Tawhitinui Reach of the Pelorus Sound which will be affected by most of the proposed new farms to be high to outstanding.
- 100 The above surface natural character values will be significantly reduced due to the presence of the new farms and the associated human activity⁵⁵. The effects will be cumulative because of the concentration of farms in the one part of the Reach, and in my opinion, will be significant.
- 101 The sub-surface natural character values will also be reduced. This includes effects on the benthos where entirely new footprints of modifications from current levels of natural character will be produced. This includes areas which meet the benthic guidelines but which are nevertheless substantially modified⁵⁶. It also includes effects on the water column which will have to "treat" 80% of the discharged nutrients, and other underwater effects such as lighting at some times of the year and underwater noise. As noted by Dr Steven, behaviour patterns of larger marine creatures and seabirds may change.
- 102 As pointed out by Mr Schuckard, this is the environment within which seabirds feed as well as where fish spend their lives. King Shag are part of the special natural character values of this area, and the potential effects are largely unknown but are expected to be negative.
- 103 In contrast, the Pelorus Sound areas where farms are to be removed do not have these high values due to human settlement (Waihinau), and extensive establishment

⁵⁵ A degree of modification is recognised in the various landscape assessments, and by the recreational/tourism review in relation to at least one of the sites (mid-bay Waitata).

⁵⁶ The benthic guidelines allow reduction in natural character from deposition and reworking in a way that may result in a reduction in biodiversity while increasing the biomass through organisms suited to highly enriched locations within the ES5 Enrichment Footprint. A much greater area is affected by deposition at the ES3 level, but to a lesser extent.

Written Comment No: 0598

of mussel farms nearby (Forsyth and Crail Bay) which have already modified the sea bed, along with the existing effects of the existing salmon farms.

Effects on Landscape and Natural Feature Values

104 It is clear from the various commentaries that the mapped areas of outstanding landscape in the Sounds Plan are outdated and the plan review process which is partly underway which will establish the values through a robust process. In the meantime, all opinions must be considered and robustly evaluated to meet RMA requirements. Given the inconsistency that is apparent between the Hudson report and the Williams review as well as Dr Steven's criticisms, the extent of effects cannot be certain but all three commentators acknowledge a degree of adverse effects on landscapes and natural features that are at the higher end of the spectrum.

105 As noted earlier, I agree with Dr Steven's approach and his assessment of natural landscape values as outstanding. My own geographical assessment of the Tawhitinui Reach ria coastline is that its natural feature values are also outstanding.

106 The proposal has cumulative effects on landscape values (taking into account the two existing salmon farms approved by the BoI) which are described in the Williams review to be high, and considered by Dr Steven to be unacceptable. I agree with these assessments.

Benthic and Water Column Effects

107 These aspects have been noted above in relation to natural character. While there is now an agreed method to manage benthic effects, there are nevertheless effects which would be provided for which will affect natural character.

108 There is as yet no such method of managing water column effects, and the consequences (even at preliminary discharge levels) are not known. There is the potential for a range of adverse events associated with effects of low probability but

Written Comment No: 0598

high potential impact⁵⁷, the risks of which are clearly not understood. These risks include high risk to King Shag. Mr Schuckard's evidence deals extensively with such risks.

109 My opinion on the sub-surface effects of the proposal is that they are currently poorly understood or unknown, could be significant, and will be cumulative, both in relation to the sites already approved through the BoI and amongst themselves.

110 The BoI adopted a cautious (but not fully precautionary, which would have resulted in the decline of all sites due to uncertainty) approach in the face of such uncertainty, and I agree that such effects require such an approach, starting from the BoI's established "permitted baseline" which applies to the two new farms.

Effects on Recreation/Tourism

111 The TRC report identifies concerns with the mid-channel Waitata site. The concern raised relates essentially to natural character values on which the Sounds tourism attraction is largely based.

112 The report does not address cumulative effects – however, the attraction of this part of the Pelorus Sound as a wild/wilderness destination will, in my opinion, be significantly reduced if the area becomes industrialised for salmon farming as the proposal provides.

Cumulative Effects

113 As can be seen from this brief summary, the additional salmon farms promoted for the Waitata Reach in the proposal will have a range of adverse effects. These effects are compounded because of the clustering of the proposed sites in a highly visible and natural part of Pelorus Sound. It is my opinion that the area will take on a significantly industrial character as a result of these effects. There will also be cumulative effects in

⁵⁷ Such an event was experienced in Wellington Harbour in the late 1990's; it was not foreseen, nor are the conditions predictable into the future.

Written Comment No: 0598

the water column and benthic areas, the potential impacts of which are poorly understood but could be very significant.

Does the Proposal Continue to Give Effect to the NZ Coastal Policy Statement?

114 This is a key consideration, particularly given the exclusion of the need for the Minister of Conservation's approval. As noted earlier in this evidence, the Minister of Aquaculture could not be expected to make such a judgement given the limited mandate of the role.

115 As the NZCPS (2010) effectively post-dates the Sounds Plan⁵⁸, simply integrating the new proposal into the Sounds Plan framework through regulation will not necessarily ensure that the changes give effect to the requirements and directions of the NZCPS. Careful enquiry is needed to answer the question posed above.

116 I do not consider that the proposal gives effect to the NZCPS provisions, for the reasons set out in the table below. My tabulated commentary takes into account my opinions on effects, noted above.

117

NZCPS Provision	Reason for failure to give effect
Objective 1 Safeguarding the coastal environment's integrity, form and function, and sustaining its ecosystems.	The integrity, form, functioning and resilience of the marine component of the coastal environment will not be safeguarded, nor its ecosystems sustained due to: <ul style="list-style-type: none">– lack of recognition of the need for protection of King Shag habitat, with consequential risks to New Zealand's biodiversity– coastal water quality is not maintained because of discharges associated with the human activity of salmon farming– the enhancement provided for by retiring low-flow sites is not addressing existing significant adverse effects (any benefits will be minor)– the scale of discharges is such that natural biological processes will not be maintained or enhanced.

⁵⁸ Although the Sounds Plan became fully operative in 2011, the contents were in train well before the NZCPS (2010) was approved.

Written Comment No: 0598

NZCPS Provision	Reason for failure to give effect
<p>Objective 2 Preservation of natural character and protection of natural features and landscapes</p>	<ul style="list-style-type: none"> – natural character is not preserved, and the values of landscapes and natural features are not protected, as neither has been able to be comprehensively evaluated and subject to an RMA process for a number of years – the locations chosen are mostly currently in areas where all but transient use is permitted and all developments are prohibited in the Sounds Plan.
<p>Objective 3 Treaty principles and kaitiaki roles</p>	<p>Treaty principles and cultural impact are subject to ongoing consultation with iwi. It is not possible to form a view other than this aspect of the NZCPS has not yet been given effect to in the proposal. (For this reason I make no comment on Policy 2 either).</p>
<p>Objective 4 Maintaining and enhancing public open space and recreational qualities</p>	<p>While the proposal is promoted as one that replaces one site with another, the new sites are all in prominent locations and so the proposal does not maintain and enhance the public open space qualities and recreation opportunities of the coastal marine area.</p>
<p>Policy 3 Precautionary approach (only Policy 3(1) applies)</p>	<p>A precautionary approach would provide that the two recently consented salmon farms in the Waitata Reach are able to be developed over time, subject to management and monitoring, as the BoI provided. The proposal does not give effect to this policy.</p>
<p>Policy 4 Integration</p>	<p>The proposal does not provide for integrated management of natural and physical resources, as it has been decoupled from the plan review process, which would provide for integrated planning and consideration in a co-ordinated way.</p> <p>The proposal does not give effect to (v) as significant adverse cumulate effects can be anticipated.</p>
<p>Policy 6 Activities in the coastal environment (Policy 6(2))</p>	<p>While at the present time salmon farming has a functional need to occupy the marine environment, the sites chosen, the intensity of use, and the requirements associated with the BoI approved sites mean that the Waitata Reach farm sites are not “appropriate” in terms of Policy 6(2)(c).</p>
<p>Policy 7 Strategic Planning</p>	<p>This policy recognises RPSs and plans as a framework through which areas and types of appropriate development are identified and provided for, and other areas and types of use are avoided, where given activities will be inappropriate (usually for reasons relating to other NZCPS requirements). This process has not been</p>

Written Comment No: 0598

NZCPS Provision	Reason for failure to give effect
	<p>followed, and the proposal has been promoted outside the available and timely regional policy statement and plan development and formal statutory processes. Instead, the proposal has proceeded on the basis of picking winners and promoting them through a process which is divorced from strategic planning.</p> <p>This policy also requires that resources and values at significant risk of adverse cumulative effects are identified and managed or avoided. In contrast, the proposal carries with it the potential for significant adverse cumulative effects – particularly relating to the Waitata Reach and its resources and values.</p>
<p>Policy 8 Aquaculture</p>	<p>This policy requires recognition of the contribution of aquaculture, and its provision in RPSs and plans in appropriate places in the coastal environment. The proposal seeks to make provision which is not appropriate, given the findings of the BoI and the provision of the two new sites that it considered to be an appropriate level of provision for salmon farming in the Waitata Reach.</p>
<p>Policy 11 Indigenous biological diversity</p>	<p>This policy requires avoidance of adverse effects on habitats and species, including on threatened or at risk species, habitats of naturally rare species, and areas containing nationally significant examples of indigenous community types. The Waitata Reach sites are part of the very limited habitat of King Shag, and all adverse effect on these species must be avoided.</p>
<p>Policy 13 Preservation of natural character</p>	<p>There is lack of agreement on the natural character values in the Waitata Reach, however it seems it may be outstanding, and is at least high. This policy requires at least avoidance of significant adverse effects, and avoidance remedy or mitigation of other adverse effects (Policy 13(1)(b)). In my opinion it is equally likely that Policy 13(1)(a) should apply and complete avoidance of all adverse effects is required. The policy also requires that RPSs and plans identify areas of high natural character and above, and that provisions to preserve natural character are included in plans. This context is not yet available, and the proposal cuts across this policy in any case due to the location and clustering and intensity of development of the proposed farms resulting in significant cumulative adverse effects. Adverse effects have not been appropriately avoided, remedied or mitigated.</p>

Written Comment No: 0598

NZCPS Provision	Reason for failure to give effect
<p>Policy 15 Natural features and natural landscapes</p>	<p>This policy operates in a similar fashion to Policy 13, in relation to natural features and landscapes. There is a similar lack of agreement on landscape and natural feature values, so the requirement of Policy 15(a) may apply, but at least the requirements of Policy 15(b) apply and significant adverse effects must be avoided and other effects avoided, remedied or mitigated. If the areas comprise on outstanding natural feature and landscape as assessed by Dr Steven, then all effects must be avoided.</p> <p>As with Policy 13, Policy 15 plan requirements have not been put in place and the proposal cuts across this process. Significant adverse effects have not been avoided, and other adverse effects have not been avoided, remedied or mitigated.</p>
<p>Policy 23 Discharges of contaminants</p>	<p>Particular regard must be had to the nature and sensitivity of the receiving environment where discharges are concerned. The extent of the discharges, and the risks associated with them particularly relating to King Shag habitat, means that this policy is not given effect to in the proposal.</p>

118 I acknowledge that NZCPS (2010) Policy 6(2)(a) and (c) require recognition that some activities functionally need to be located in the coastal marine area, and that these can contribute to wellbeing. This requires an assessment of both the activity and whether the place is appropriate for it. As set out in my evidence on effects and the tabulated policy assessment above, the locations chosen are not appropriate and the intensity of development proposed is equally not appropriate. Policy 6(2)(e) requires the efficient use of occupied space in the coastal marine area. In this case the environmental implications of the proposed use are not known. Time should be provided for the BoI's approved sites to be developed to the extent provided for (subject to the environmental requirements through established conditions) so that their efficiency and environmental implications can be assessed.

119 I also note that Policy 14 seeks to promote restoration and rehabilitation of natural character in the coastal environment, and that the proposal intends to relinquish consents in low-flow areas. As stated earlier in this evidence, the areas which would

Written Comment No: 0598

be restored under this provision are of lesser inherent value than the areas that would be adversely affected, due to their already modified locations. Policy 21 has similar implications in relation to water quality, and is similarly of limited benefit when applied through the proposal.

- 120 Overall, I consider that numerous NZCPS (2010) policy provisions are not given effect to through the proposal. Amongst these are policies relating to natural character, landscape values, ecological protection and discharge risks.

Does the Proposal Continue to Give Effect to the RPS?

- 121 The RPS provisions can be considered to be outdated, as well as now also potentially inconsistent with the NZCPS (2010). No reliance could be placed on an analysis of the proposal in terms of these outdated provisions. The current review process would have remedied this situation. The proposal however cuts across and removes the opportunity to achieve consistency in terms of process and outcome.

RMA PART 2

- 122 It is not clear to me whether the regulation powers under sections 360A and 360B are subject to Part 2, although it would be very strange if they were not. Normally, regulations deal with the “rats and mice” of RMA processes and, *ipso facto*, Part 2 matters should not be raised, let alone at risk. In this case, where regulatory powers are replacing plan change processes, a Part 2 assessment is important.
- 123 Part 2 sets out the RMA’s purposes and principles (section 5), matters of national importance which any decision-maker must recognise and provide for (section 6), other matters to which decision-makers must have particular regard (section 7), and a requirement to take into account Treaty principles (section 8). My analysis follows.

Written Comment No: 0598

Section 5

- 124 The proposal sets up a classic conflict in terms of “use, development and protection” in a Sounds location where natural values are high and, in my opinion, where the protection component of management should overwhelmingly apply. Although GDP and employment growth are promised, details and implications of the employment are not expanded upon (For example, who will be employed; where will they live; how will they travel to work; etc). The closure of the current low-flow sites (which is promoted as a major benefit) would, in the fullness of time, most likely occur in any case and in my assessment is a minor benefit only.
- 125 In section 5 terms, it is not entirely clear that the life-supporting capacity of the water column is being safeguarded or that ecosystems (including King Shag as a species) are being safeguarded (section 5(2)(b)). Adverse effects on the environment are not being adequately avoided or mitigated in relation to valued components of the environment, particularly in the at Waitata Reach (section 5(2)(c)).

Section 6

- 126 In terms of section 6(a), the natural character of the coastal environment is not preserved and existing (at least high and possibly outstanding) natural character is not protected from inappropriate use and development. The intensity and cumulative nature of the proposal mean that effects are likely to be significantly adverse.
- 127 A similar situation exists in relation to section 6(b) matters, although the extent to which existing natural landscapes and natural features are outstanding is subject to disagreement amongst experts.

Written Comment No: 0598

128 There is no doubt that the Waitata Reach, where a cluster of farms is part of the proposal, is part of a significant habitat (in fact the only habitat) of King Shag. The proposal does not protect this habitat as required (section 6(c))⁵⁹.

129 Of the remaining section 6 matters, only section 6(d), public access, is likely to be relevant. The placement of the mid-channel Waitata Reach site seems particularly unacceptable in terms of this provision for public access, as it breaks up and bisects the wide and wild natural channel that is the Reach.

Section 7

130 Of the section 7 matters to which particular regard must be had, the following may be relevant:

- a) Kaitiakitanga
- aa) the ethic of stewardship
- b) the efficient use and development of natural physical resources
- c) the maintenance and enhancement of amenity values
- d) the intrinsic values of ecosystems
- f) the maintenance and enhancement of the quality of the environment.

Item (h), the protection of the habitat of trout and salmon, is not considered relevant, as these are farmed animals and their habitat is not threatened. My comments on relevant section 7 matters are set out in the following paragraphs.

131 In my opinion, the ethic of stewardship is not well-served by the proposed relocation and significant expansion of salmon farming enabled in the proposal. Stewardship would not provide for development beyond that provided for by the BoI. Kaitiakitanga is dependent on the outcome of consultation with iwi.

132 The efficient use and development of natural resources is claimed as a fundamental benefit of the proposal. However, the proposal also relies on the ability of the natural environment to “treat” the discharges and on benthic modifications, visual effects and

⁵⁹ Waitata Reach is the most important habitat for the Duffers Reef colony – the biggest colony.

Written Comment No: 0598

other aspects of the proposal being appropriate in the environment concerned. I consider that the extent of the proposal go well beyond considerations of efficiency of natural resource use and will result in unacceptable adverse effects. In this I am in agreement with the BoI when it considered a five-farm proposal in a similar area, rejecting three of the five in Waitata Reach.

- 133 The proposal will not result in the maintenance and enhancement of amenity values or the quality of the environment, due to the extent of effects, including cumulative effects. If it is found that the landscape and natural features values are not outstanding, then it is likely they are amenity landscapes at the high end of the scale, which should be maintained and enhanced. Water quality is not maintained or enhanced by the proposal.
- 134 The final item; the intrinsic values of ecosystems, has always been somewhat obscure in its application. However, in terms of the potential effects on King Shag, values must be considered to be intrinsic, and I consider that these values have not been properly safeguarded in the proposal.

Section 8

- 135 As consultation is not complete with iwi, and any cultural implications are not yet clarified, it is not yet possible to assess consistency with this section.

Part 2 Summary

- 136 I am not satisfied that the proposal is in accordance with RMA Part 2, assuming that it is relevant. There are many aspects of Part 2 which the proposal does not achieve. The proposal promotes economic development at the expense of many other important Part 2 considerations in the Waitata Reach of Pelorus Sound.

Written Comment No: 0598

CONCLUSION FROM MY ANALYSIS

- 137 As with others providing evidence for Friends of Nelson Haven and Tasman Bay and the Kenepuru and Central Sounds Residents' Association I consider that the decision of the BoI on the King Salmon plan change request in relation to salmon farming in the Waitata Reach, and the subsequent Environment Court decisions on the proposed salmon farm at Danger Point, were correct and should be able to be upheld, with only the two new approved farms implemented progressively as provided for.
- 138 The four low-flow sites in the vicinity should be allowed to "run their course" through normal reconstituting processes. They are currently part of the existing environment and their effects should reduce over time or they will phase out due to the normal operation of the market.
- 139 On the basis of this and the matters covered earlier in this evidence, including NZCPS and RMA Part 2 considerations, my opinion is that none of the proposed new salmon farms in Waitata Reach should be provided for by regulation by the Governor-General.
- 140 The application of regulations for the current purpose is a misuse of regulatory powers and inconsistent with RMA processes.

COMMENTARY ON POTENTIAL AMENDMENTS TO THE SOUNDS PLAN

- 141 Although I do not agree that any of the sites in the Waitata Reach should proceed, I have nevertheless reviewed the amendments put forward in the discussion document for the proposal. I have identified a number of issues, ranging from typographic errors to more substantive comments, as set out in the table below. This is not an exhaustive list as there will be matters I have overlooked. I have not provided comments on the Appendices due to lack of time.

Written Comment No: 0598

142

Discussion document page reference	Comment
<p>p70, first strike-out</p> <p>p70, first addition</p> <p>p70, change immediately above 9.2.1</p>	<p>This strike-out should not delete the word “expansion”.</p> <p>This addition explains the relocation of sites but does not explain the substantial expansion of activity provided for. While it is under the heading of the public access/private use issue, this is the main place where aquaculture is explained in the plan. The words “<u>and expansion is enabled</u>” should be added following the second comma.</p> <p>A small change has been made here which is misleading, as it implies that all new salmon farming sites have been achieved by plan change. This is not correct and the change here should be replaced by something that is correct – if any change here is worth making.</p>
<p>p70, new item (b) in 9.2.1.1.1.7</p> <p>p70, explanation relating to Policy 9.2.1.1.7</p> <p>p71, two additions lowest on the page</p>	<p>This lists out the sites for relocation in priority order. I note that the Tory Channel and Otanerau Bay sites are highest priority. As only one relocation site is provided for in that part of the Sounds, the scenario exists where one or two new sites are added in Waitata Reach, but no existing low-flow sites are removed. It is not clear that this possibility has been taken into account in any of the assessments relating to cumulative effects, and it should have been. The later provisions are not clear as the order of new sites, which I consider should be incorporated.</p> <p>Further, it is not clear why there is not a policy provision similar to 9.2.1.1.1.7 referring to the new sites and their restricted discretionary status.</p> <p>While the existing wording refers to “appropriate locations” which is a valid RMA policy explanation, the new addition to the wording is extremely loose. Again, the expansion provided for through relocation is not acknowledged. Further, the change to the policy here prioritises sites to relocate from, but is not matched by a primary order for new sites. Again, this seems surprisingly loose, and would be important to add.</p> <p>Wording added to the Rule method statement and the general explanations do not clarify that intensification is also part of the new provisions.</p>

Written Comment No: 0598

<p>p72, new Policy 9.3.2.1.12</p>	<p>This appears to have general application to all salmon farms, both existing and new. While the policy appears to be directed in a useful way, I do query its practical application. In a dynamic environment, many of the items listed are notoriously difficult to establish causal responsibility for. Because of this, the policy may be the subject of endless future argument. In my opinion, all items should be prefaced with the wording “to not cause or contribute to...” rather than just “to not cause”. This would somewhat reduce the burden of proof in terms of a sole causal responsibility.</p>
<p>p74, Rule 3.5.3.3.2 matters to which discretion is limited</p>	<p>I do not understand why effects on water quality, item (e), is limited to a salmon farm and salmon farming at Tio Point. As this is a matter directly related to monitoring and build-up, it should also be a matter of discretion at all farms.</p> <p>I also do not understand why item (g), does not refer to marine farming as well as the marine farm when it come to the King Shag Management Plan. The inconsistency with wording of the other provisions is likely to raise issues.</p>
<p>P75, Rule 35.3.3.3</p>	<p>The rule preventing public notification is of concern, as it acts as a black on the ability to notify even when special circumstances may justify notification.</p>

Sylvia Allan
27th March 2017

Written Comment No: 0598

In the matter of

Ministry for Primary Industries Discussion
Paper No: 2017/04

Potential relocation of salmon farms in the Marlborough Sounds – Proposal to amend the Marlborough Sounds Resource Management Plan to enable the relocation of up to six existing salmon farms by regulations made under section 360A of the Resource Management Act 1991

Summary of concerns by way of comment by Friends of Nelson Haven and Tasman Bay Inc. and Kenepuru and Central Sounds Residents Association Inc.

Dated 27 March 2017

Counsel: JC Ironside

Wakefield
Nelson 7095



Introduction

1. This memorandum is on behalf of Friends of Nelson Haven and Tasman Bay Inc. (**Friends**) and the Kenepuru and Central Sounds Residents Association Inc. (**KCSRA**) (collectively **the Societies**). The Societies have concerns about the proposal to amend the Marlborough Sounds Resource Management Plan (**MSRMP**) to enable the relocation of up to six salmon farms by regulations made under section 360A of the Resource Management Act 1991 (**RMA**). This memorandum summarises their concerns and accompanies expert evidence that is filed on their behalf.
2. The Societies are long established groups having an interest in coastal issues affecting the Marlborough Sounds. Friends' interests extend across coastal areas of Te Tau Ihu. KCSRA have a more direct interest in matters affecting the Pelorus Sound. The Societies have collaborated on other matters of interest affecting the Marlborough Sounds, and do so again for the purposes of this proposal.

Initial observations – Ministers' powers

3. The proposal is advanced on behalf of the Minister for Primary Industries in his capacity as the Minister of Aquaculture (**Minister**). The first requirement for the Minister is to have regard to the provisions of the regional coastal plan that will be affected by the proposed regulations.¹ There is also a requirement that the Minister must be satisfied that the regional coastal plan to be amended by the proposed regulations will continue to give effect to the NZCPS,² and any applicable regional policy statement.³
4. The requirement to have regard to the provisions of the regional coastal plan must mean that the Minister should have proper and meaningful regard to relevant provisions of the MSRMP and their effect, and not perfunctory or summary regard. It is doubtful whether this has occurred in relation to the underlying rationale for the Coastal Marine Zone 1 (**CMZ 1**) under the MSRMP.⁴

¹ Section 360B(2)(a).

² New Zealand Coastal Policy Statement 2010, effective 3 December 2010

³ Section 360A(2)(c)(iii)

⁴ An initial assessment of the proposal against the policy requirements of the various statutory documents is contained in the MWH January 2017 report. There is considerable reliance on the existing reports commissioned by MPI in promoting this proposal. Section 3.1 of the MWH report anticipates a full policy analysis being prepared after the consultation and

Written Comment No: 0598

5. The introduction to chapter 9 of the MSRMP identifies that management of the coastal marine area is a shared responsibility of the Marlborough District Council (**MDC** or **Council**) and the Minister of Conservation under section 30(1)(d) of the RMA. That Minister must approve the relevant coastal provisions of the MSRMP, as well as having responsibility for the NZCPS, which has an important influence on Council's management of the coastal environment.⁵

6. The issue identified at chapter 9-2 is the restriction of public access to the coastal marine area due to the private occupation of public space. The objective at 9.2.1 is:

The accommodation of appropriate activities in the coastal marine area whilst avoiding, remedying or mitigating the adverse effects of those activities.

7. Policies 1.1 and 1.6 within chapter 9.2 are specifically referred to as identifying the values which provide the basis for the CMZ 1. The explanation for CMZ 1 states:

In the Coastal Marine Zone 1 the Plan identifies those areas where marine farms are prohibited in accordance with Policies 9.2.1.1.1 and 9.2.1.1.6. These areas are identified as being where marine farming will have a significant adverse effect on navigational safety, recreational opportunities, natural character, ecological systems, or cultural, residential or amenity values.

8. For the Coastal Marine Zone 2 (**CMZ 2**), where marine farming is able to be consented, there is this explanation for the applicable rules.

Within Coastal Marine Zone 2 out to 50 metres from mean low water mark, and beyond 200 metres from mean low water mark, marine farms are non-complying activities. In those areas marine farming involving fin fish farming may be appropriate and it is recognised that consent may be granted by a resource consent application.

report process has been completed. It is unclear what form this full policy analysis will take, or what opportunity there will be to comment on it.

⁵ MSRMP, chapter 9 at 9-1

Written Comment No: 0598

9. The Coastal Marine Zone 3 was introduced into the MSRMP in 2013 to give effect to the NZKS plan change proposal that was referred to a board of inquiry for determination under Part 6AA of the RMA. A new policy 1.17 was introduced into chapter 9-2 as the basis for identifying three sites for new salmon farming activities that were formerly within CMZ 1. A further five sites within CMZ 1 were not approved, as well as a site within CMZ 2.⁶
10. At section 4.3.4 of the MPI discussion paper, there is this reference to the three coastal marine zones in the MSRMP:

CMZ 1, which makes up about 80 percent of the Marlborough Sounds, recognises the natural landscape and environment that contributes to the region's culture, heritage and tourism. CMZ 1 generally prohibits aquaculture as part of the approach to ensure that allocation of public space for private use does not occur at the expense of public access and recreation values. There are however 22 marine farms in CMZ 1, comprising farms that existed before CMZ 1 came into force when the Marlborough Sounds Resource Management Plan became operative.

CMZ 2 recognises the productive value of aquaculture to the region, and allows applications to be made for marine farming under a range of activity statuses, depending on factors such as when the farm was originally consented and its location relative to the shore. There are approximately 558 marine farms within CMZ 2.

CMZ 3 was created specifically for the three salmon farms approved by the Environmental Protection Authority in 2013, and are the only farms in this zone. These sites were previously CMZ 1. Salmon farming within CMZ 3 is a discretionary activity, provided that it complies with the standards specified in the plan.

Like the Marlborough Regional Policy Statement, the Marlborough Sounds Resource Management Plan also contains a series of objectives and policies that are relevant to the management of the

⁶ The CMZ 1 sites refused were Kaitira, Tapipi (Pelorus Sound), Papatua (Port Gore), Kaitapeha, Ruamoko (Queen Charlotte Sound). The CMZ 2 site was at White Horse Rock (Pelorus Sound).

Written Comment No: 0598

coastal marine area in the Marlborough Sounds, and to salmon farming.

11. This summary of the coastal marine zones under the MSRMP then leads into Part 3 of the discussion paper, which explains the proposed amendments to the MSRMP to enable the relocation proposal to proceed.⁷ This is on the basis that a number of existing salmon farms exceed benthic environmental standards set out in management guidelines developed for salmon farms in the Marlborough Sounds.⁸ The relocation proposal is intended to give effect to the Minister's stated commitment to *seeing the Benthic Guidelines implemented*.⁹
12. The establishment of a number of new salmon farms in the CMZ 1 requires a comprehensive assessment of the values that underpin that zone. That was what was required for the 2012/13 NZKS plan change proposal (a proposal of national significance under Part 6AA), which has similarities in terms of scale to what is now being proposed. The importance in maintaining the integrity of the coastal marine zones under the MSRMP is to ensure that the environmental results anticipated by the plan will continue to be met. Over the life of the MSRMP, consented space for marine farming in CMZ 2 has expanded from approximately 1000 ha in 1996 to approximately 2500 ha today. Provision has been made for marine farming in that zone. Allowing further incursion into CMZ 1 for marine farming requires a very careful assessment.
13. Embedded within the proposal appears to be a preoccupation with the concept of 'relocation', as if that somehow diminishes the impact of this intrusion into the CMZ 1. However, that is not a concept that is recognised under the MSRMP. At chapter 9-7, there is the explanation

Separate provision for marine farm transfer sites is no longer appropriate as there is no consistent demand for any particular location or description of the effects of transferring marine farms. Accordingly, transferring a marine farm is treated as a new site where adverse effects can be considered. (Emphasis added)

⁷ Set out in full in Appendix 1

⁸ Best Management Practice Guidelines for salmon farms in the Marlborough Sounds, January 2015 MPI Technical Paper No: 2015/01

⁹ Ministerial foreward page 3 of discussion paper no: 2017/04

Written Comment No: 0598

14. As a new activity at a new site, all of the values that the CMZ 1 seeks to protect (and the anticipated environmental results) must be comprehensively considered. Furthermore, the values that are likely to be affected are predominantly those that are within the shared responsibility of the Council and the Minister of Conservation under section 30(1)(d) and reflected in policies of the NZCPS. They are not matters that a Minister of Aquaculture has primary responsibility for. This is reflected in the allocation of functions and powers to various Ministers under Part 4 of the RMA, including the functions of the Minister of Aquaculture under section 28B. Ms Allan comments on this in some detail in her evidence.
15. What this indicates is that the Minister's regulation making powers are not as extensive as a literal reading of section 360A and 360B might suggest. Of course, the meaning of any enactment must be ascertained from its text in the light of its purpose.¹⁰ The relevant context includes those provisions of the RMA that confer on the Minister of Conservation a responsibility for the control of activities in the coastal marine area and for approving the provisions of any regional coastal plan before it is made operative.¹¹ That includes the provisions that underpin the CMZ 1.
16. When the requirement that any plan amended by regulations under section 360A must continue to give effect to the NZCPS (and any regional policy statement) is added to the relevant context, it becomes clear that the regulation-making power is a limited one that must be exercised within a relatively narrow scope.¹² Where, as here, the proposal is to create new salmon farming sites within CMZ 1 affecting recognised significant values that go beyond the suitability of the sites for aquaculture development, that is beyond the scope of the powers of the Minister of Aquaculture.
17. The Minister's regulation-making powers are effectively circumscribed by policy 8 of the NZCPS. He may exercise his powers to include in a regional coastal plan provision for aquaculture activities in 'appropriate places', while still continuing

¹⁰ Interpretation Act 1999, section 5(1)

¹¹ Sections 28, 28A and clause 19 of schedule 1

¹² See also Ms Allan's evidence at paras 68 – 73

to give effect to the NZCPS as a whole. As the Supreme Court has emphasised in *King Salmon*,¹³

[100] The scope of the words 'appropriate' and 'inappropriate' is, of course heavily affected by context. For example, where policy 8 refers to making provision for aquaculture activities 'in appropriate places in the coastal environment', the context suggests that 'appropriate' is referring to suitability for the needs of aquaculture (for example, water quality) rather than to some broader notion. That is, it is referring to suitability in a technical sense. By contrast, where objective 6 says that the protection of values of the coastal environment does not preclude use and development 'in appropriate places and forms, and within appropriate limits', the context suggests that 'appropriate' is not concerned simply with technical suitability for the particular activity but with a broader concept that encompasses other considerations, including environmental ones.

19. And later at paragraph [126], the Supreme Court said:

*[126] We agree with Mr Kirkpatrick that the language of the relevant policies in the NZCPS is significant and that the various policies are not inevitably in conflict or pulling in different directions. Beginning with language, we have said that 'avoid' in policies 13(1)(a) and 15(a) is a strong word, meaning 'not allow' or prevent the occurrence of', and that what is 'inappropriate' is to be assessed against the characteristics of the environment that policies 13 and 15 seek to preserve. While we acknowledge that the most likely meaning of 'appropriate' in policy 8(a) is that it relates to suitability for salmon farming, the policy does not suggest that provision must be made for salmon farming in **all** places that might be appropriate for it in a particular coastal region.*

18. To the extent that a plan change proposal affecting aquaculture activities goes beyond technical suitability and affects areas where aquaculture is currently prohibited for the protection of the broader considerations contemplated by objective 6, then a regulation making-power cannot be regarded as a suitable plan change process. That is made clear by policy 7 of the NZCPS, which is directed at strategic planning and states relevantly:

Policy 7 Strategic planning

¹³ *Environmental Defence Society v New Zealand King Salmon Co Ltd* [2014] NZSC 38

Written Comment No: 0598

(1) In preparing regional policy statements, and plans

(a)....

(b) identify areas of the coastal environment where particular activities and forms of subdivision, use and development:

(i) are inappropriate; and

(ii) may be inappropriate without the consideration of effects through a resource consent application, notice of requirement for designation or Schedule 1 of the Act process;

and provide protection from inappropriate subdivision, use and development in these areas through objectives, policies and rules.

19. Where (as here) a proposal seeks to make provision for aquaculture in an area where aquaculture is currently prohibited (that prohibition considered necessary to give effect to a variety of recognised significant values), then the plan change process must go through the schedule 1 process. This provides for submissions and public hearings. Where rights of appeal are exercised, any adjudication by the Environment Court is in the form of an inquiry and report to the local authority and Minister of Conservation, who must ultimately approve the regional coastal plan, and any changes to it.¹⁴
20. A narrow purpose for promoting the plan change regulations (so that Benthic Guidelines can be implemented at sites not currently used for salmon farming) does not overcome the requirement for strategic planning in the coastal environment. This requires a full consideration of the values, uses and characteristics that are protected within the CMZ 1, and how they are affected by this proposal. A truncated regulation-making process under section 360B does not suffice. More than technical suitability is at stake, and the Minister of Aquaculture is the 'wrong' Minister to assume responsibility for changes that go to the very heart of coastal marine zoning under the MSRMP.

¹⁴ See footnote 11

Written Comment No: 0598

Further concerns – proper consideration and confusion of processes

21. Even if the Minister can assume wide-ranging powers to promote regulations under section 360A, it is clear that this proposal should not be the subject matter of such regulations.
22. These concerns are referred to in more detail in the evidence of Dr Steven, Mr Schuckard and Ms Allan for the Societies. I comment further as follows.
 - (i) There is no sound basis for adding additional salmon farms into either the Waitata Reach or Tory Channel. These are required to be treated as new farms under the MSRMP. A comprehensive plan change for expansion of salmon farming in the Marlborough Sounds was inquired into by the NZKS board of inquiry as recently as 2012 and 2013. It found that an appropriate level of development of new farms in the Marlborough Sounds was four, reduced to three after the decision of the Supreme Court in *King Salmon* (declining the plan change for the Papatua farm in Port Gore).
 - (ii) The sites that were selected for consideration by the board of inquiry were identified by NZKS through a vigorous selection process. The process now embarked upon lacks integrity in light of what the board of inquiry was told about that selection process. That lack of integrity is further compounded by use of a truncated decision-making process to create a further salmon farming zone (CMZ 4) without full evaluation through a schedule 1 process.
 - (iii) The MDC has recently notified the Marlborough Environment Plan (MEP), which includes a proposed regional policy statement and is at an early stage in the schedule 1 process. Despite clear intentions that new aquaculture provisions were to be included in the notification of this proposed plan, they have not been. A proposal such as this should be part of the consideration of new aquaculture provisions that are currently being consulted on.
 - (iv) The Minister only has power to make changes to an operative plan and not a proposed plan. The process he is

embarking on cuts across the proper consideration of aquaculture provisions to be included in a second generation RMA plan (and regional policy statement). Had the MDC notified its aquaculture provisions at the same time as it notified the rest of the MEP, then it is unlikely that there would be any consideration of using these regulation-making powers.

- (v) What this proposal amounts to is the unprecedented use of regulations to amend a first generation RMA plan while the second generation plan is at an early stage of the schedule 1 process. The aquaculture provisions were removed from the MEP at a late stage (just prior to notification) and are now the subject of further pre-notification consultation. Had those aquaculture provisions been notified (as originally intended) when the MEP was publicly notified, these proposed regulations would have had no effect on those provisions. The Minister's proposal impacts on the integrity of the parallel schedule 1 process being followed for the MEP. It will have an unwarranted influence on substantive consideration of the MEP (including the proposed regional policy statement) through the schedule 1 process.
- (vi) The proposals cut across findings made the NZKS board of inquiry and the Environment Court in *KPF Investments Ltd v MDC*¹⁵ about the appropriate level of salmon farming development in the Waitata Reach. This was the subject of discussion among members of the Marlborough Salmon Working Group and Mr Crosby will be familiar with its genesis. I provided an opinion on these matters to a member of the Group, which was made available to the Group as a whole. Two other opinions were also commissioned. My opinion is *attached*. It is entirely consistent with the findings of the board of inquiry and the Environment Court. The other opinions seek to draw distinctions between the findings of the board of inquiry and the Environment Court that in my view are unwarranted.
- (vii) A process seeking to establish a number of new salmon farms in the Marlborough Sounds before the new farms authorised by the NZKS board of inquiry are at full capacity under the adaptive management regime approved for those

¹⁵ [2014] NZEnvC 152

Written Comment No: 0598

farms risks undermining that regime. A pre-occupation with implementing the Benthic Guidelines will impact on the ability to establish an appropriate water column modelling baseline, as Mr Schuckard explains. This runs completely counter to the very detailed consideration given to this matter by the NZKS board of inquiry. The Minister's narrow approach does not allow a proper consideration of the full range of effects (including cumulative effects) from salmon farming and is contrary to the intent of policies 3 and 4 of the NZCPS. It has particular significance for the King Shag, as Mr Schuckard explains, which may also be an inhibiting factor under section 107(1)(g) of the RMA. The NZKS board of inquiry required a King Shag Management Plan to be prepared taking into account the two new farms approved for the Waitata Reach. Adding further risk to a species that is already threatened and at risk of extinction should be seen for what it is – an untenable risk that clearly conflicts with policy 11 of the NZCPS.

- (viii) Reliance on Mr Hudson's landscape assessments for these new sites lacks any credibility in light of the findings of the NZKS board of inquiry and the Environment Court in *KPF Investments Ltd*, as fully explained by Dr Steven, who was a witness in both earlier proceedings. Mr Hudson's assessments are not even fully supported by the peer reviewer. It is no exaggeration to say that on fundamental aspects of giving effect to directive policies of the NZCPS, the proposal is entirely reliant on Mr Hudson's assessments. However, as Dr Steven points out the failure by Mr Hudson to refer to policies 13 and 15 in full is a startling omission. Reliance on Mr Hudson's opinion in these circumstances would be to rely on an incomplete assessment. There is no proper basis to say that policies 13 and 15 of the NZCPS can be given effect to. This again highlights the fact that this is the 'wrong' Minister (and the wrong Ministry) to be considering natural character and landscape values (and indigenous biodiversity).
- (ix) Policies 13 and 15 of the NZCPS are directive policies that reflect the fact that environmental protection is a core element of sustainable management.¹⁶ Reliance on overlay classifications notified through the MEP, which are

¹⁶ King Salmon at [24] per Arnold J

Written Comment No: 0598

themselves the subject of submissions, again highlights the confusion of processes that this proposal generates.¹⁷ What if the overlays undergo significant change through the MEP schedule 1 process? Where does that leave Mr Hudson's assessments? If he is simply relying on those overlay classifications (which appears to be the case) then this proposal should also go through the same MEP plan development process. There is a real and significant risk of glaring inconsistencies. Again, a narrow approach to implementing the Benthic Guidelines leads to an approach which imperils sustainable management, and does not achieve it.

- (x) Ms Allan's criticisms of the process adopted for this proposal are soundly based. There are other more appropriate processes for the Minister and/or NZKS to follow to implement a proposal such as this.¹⁸

Conclusion – 'No, Minister'

23. The only proper conclusion that can be reached after considering the matters specified in section 360B is that the Minister would be wrong to recommend regulations under section 360A to implement this proposal. It would be in excess of his powers to do so. The MSRMP would not continue to give effect to the NZCPS, and important environmental protection would be sacrificed in a wholly inappropriate way.



JC Ironside
Counsel for Friends of Nelson Haven and Tasman Bay Inc. and
Kenepuru and Central Sounds Residents Association Inc.
27 March 2017

¹⁷ Dr Steven's report which accompanies the Societies submissions on the MEP is attached to his evidence.

¹⁸ See Ms Allan's evidence at paras 74 - 78

J.C. Ironside
MA (Cambridge)
Barrister

Mr Rob Schuckard
[REDACTED]
Rai Valley 7145

21 September 2016

Dear Rob

RE: NEW ZEALAND KING SALMON – BOARD OF INQUIRY

Instructions

1. You have asked me to address a number of questions that have arisen during the course of deliberations by the Marlborough Salmon Working Group (**MSWG**), of which you are a member in your capacity as a member of the Sounds Advisory Group. The questions concern a consideration of cumulative effects arising out of the February 2013 report of the New Zealand King Salmon board of inquiry¹ into requests for changes to the Marlborough Sounds Resource Management Plan (**Marlborough Sounds Plan**), and for resource consents to establish nine new salmon farms in the Marlborough Sounds. The particular matters concern the board's findings in relation to the Waitata Reach. The board's decision allowed the establishment of two new salmon farms in Waitata Reach (Waitata and Richmond), but also determined that three other proposed salmon farms (Kaitira, Tapipi and White Horse Rock) should not be established. The questions are directed at whether this creates a threshold for future decision-making in relation to any new proposal to establish a salmon farm in the Waitata Reach.
2. Although the deliberations of the MSWG are confidential, you have obtained authority to instruct me in relation to this particular aspect of the MSWG's deliberations. In addition to the six questions that have been raised, you have also provided me with a copy of the terms of reference for the MSWG, which has been convened to consider options to implement the *Best Management Practice guidelines for salmon farms in the Marlborough Sounds*.² This is a technical paper commissioned by Marlborough District Council and New Zealand King Salmon (**NZKS**), the primary purpose of which is to provide consistent and clear guidelines for the management and benthic monitoring of existing salmon farms in the Marlborough Sounds. I make the initial observation that it is not immediately obvious how either the terms of reference, or the technical paper extend to a consideration of locating additional salmon farms within the Waitata Reach, if that is what is being considered by the MSWG.

¹ Board of Inquiry, New Zealand King Salmon requests for plan changes and applications for resource consents, 22 February 2013

² MPI Technical Paper No. 2015/01, January 2015

Relevant background

3. In order to properly address the six questions, it is necessary to (briefly) canvass the relevant background to the establishment of the board of inquiry. In 2007, NZKS identified to the Marlborough District Council that in order for its business to grow and meet an increasing demand for its salmon products, it needed to develop additional salmon farming sites. Through a review of possible options, NZKS had identified that additional sites were likely to be required in areas zoned coastal marine zone 1 (CMZ 1) under the Marlborough Sounds Plan. This could only be achieved through a plan change, because marine farming is generally a prohibited activity in the CMZ 1. NZKS began working on various planning initiatives between 2008 and 2011.
4. With amendments to the RMA that came into force on 1 October 2011, NZKS was able to lodge with the Environmental Protection Agency (EPA) concurrent applications for a private plan change and for resource consents to establish and operate new salmon farms at the sites applied for. NZKS applied for changes to the Marlborough Sounds Plan to establish a new salmon farming zone (CMZ 3) at eight locations. The concurrent resource consent applications were for the establishment of new salmon farms at these eight sites, and also the White Horse Rock site in Waitata Reach, which was the only site applied for that was not in CMZ 1 (it was in CMZ 2).
5. The Minister of Conservation, on the recommendation of the EPA considered the NZKS applications to be a proposal of national significance and referred the applications to a board of inquiry to determine under section 147 of the RMA. The Minister's direction addressed the relevant statutory matters set out under section 142(3) of the RMA, including that *the proposal is likely to arouse widespread public interest or concern regarding its likely effect on the environment*. The proposal was publicly notified. The EPA received more than 1200 submissions on the proposal. The hearing by the board of inquiry took place over 37 days at Blenheim, Waikawa Marae and Portage. The board received over 10,400 pages of evidence from approximately 181 witnesses and submitters. The transcript of the hearing occupies 4174 pages, with 84 exhibits. There was significant input by expert witnesses on a wide-ranging number of contested topics, including:
 - (i) the economic benefits of the proposal;
 - (ii) effects on the benthos and water column arising from nutrient inputs;
 - (iii) effects on pelagic fish, marine mammals and birds;
 - (iv) effects on the natural character and landscape characteristics of the Sounds;
 - (v) biosecurity and disease risks;
 - (vi) Maori cultural issues;
 - (vii) the integrity of the Marlborough Sounds Plan.

6. The board's inquiry into these matters was thorough and there was significant input from the many and varied Sounds communities.
7. I now turn to address the specific questions you have raised.

Question 1

Did the board of inquiry establish in its findings for Waitata Reach a cumulative threshold for further salmon farming in Waitata Reach beyond their two consented allocations?

8. The natural character and landscape context for consideration of the NZKS proposal was that the proposed new farms were to be located in some of the least modified parts of the Marlborough Sounds. Those areas had been largely protected from the impacts of marine farming by their inclusion within the CMZ 1. The board summarised this contextual conundrum at paragraphs [574] to [576] as follows.

[574] Few parts of the Marlborough Sounds are wholly natural. Mussel farming, in particular, lines the margins of many inlets and bays - from Croiselles Harbour to East Bay, and parts of Tory Channel. Throughout most of the Sounds, areas of open pasture, pockets of residential settlement and - perhaps most obvious of all - production forestry, leave their mark on the local landscape, disturbing its natural gradients and patterns. Tory Channel and the upper reaches of Pelorus Sound go well beyond this, as both appear seriously degraded from a landscape and natural character standpoint, despite being key gateways to the Sounds as a whole.

[575] Hardly surprising therefore, that some of the least modified parts of the Sounds - such as Port Gore, the Waitata Reach, and Queen Charlotte Sound approaching Picton from Cook Strait - remain in a fine state of balance. The question is - to what extent these landscapes are able to withstand change and development, and at what scale?

[576] Most of the inlets and bays either side of Pelorus Sound, as well as in the vicinity of Port Gore, are already lined by a significant proportion of the 575 consented marine farms scattered throughout the Marlborough Sounds. Fortunately, few of these current operations extend beyond their more sheltered margins out into the Sounds' main channels.

9. As to the extent of the Waitata Reach, at paragraph [644] the board identified that:

[644].....The Waitata Reach incorporates the body of water that connects Tawhitinui Reach at Maud Island to the south, to the open waters of Cook Strait to the north. The Reach is approximately 12 km long and the width of the passage typically varies between 2km and 4km.

10. In a comprehensive assessment of the effects on natural character, landscape and visual amenity that would be generated by the five farms proposed for Waitata Reach

(Kaitira, Tapipi, Richmond, Waitata and White Horse Rock), the board made the following findings.

(a) Natural character

[698] *The cumulative effect of the five proposed farms, in conjunction with the other consented salmon farms (Port Ligar and Waihinau Bay) would, in our view, have a high impact on the natural character of this Reach of Pelorus Sound. We find that, individually, each new farm would have an effect on natural character. Given the prominent locations of the White Horse Rock/Waitata site, Kaitira and Tapipi, even if only one or two of these farms were consented, the effect on natural character would be high.*

[699] *We find that the proposed farms at highly visible locations of the Kaitira and Tapipi sites would impact on the intactness of the natural character of this side of the Reach. They would have a very high impact.*

[700] *Again we acknowledge that the benthic and water column communities that contribute to subsurface natural character would be physically impacted, with the greatest impact in the immediate environs of the farms.*

(b) Landscape

[703] *The effects on the Waitata Reach as a whole were variously assessed as moderate to very high with the proposed farms at Kaitira and Tapipi having effects at the more serious end of the scale. We agree.*

(c) Visual amenity

[712] *We agree with Mr Brown that the combination of five new farms located off a series of headlands that define Pelorus Sounds would be a 'decisive' cumulative effect. The four headlands in question are all prominent landmarks, or 'way points' that help define the entry to Pelorus Sound and passage through Waitata Reach. From a visual and aesthetic point of view, the two more prominent farms off Kaitira and Tapipi are the defining element of the decisive cumulative effect.*

(d) Overall findings on natural character, landscape and visual amenity for Waitata Reach

[713] *We accordingly find that:*

- (a) *Five farms would have a **decisive** cumulative effect and from a visual and aesthetic point of view the two most prominent farms of Kaitira and Tapipi are the defining element of the **decisive** cumulative effect; and*
- (b) *At a more local level, the five proposed farms would have adverse visual effects. The most severe effects would be created by Kaitira and Richmond.*

11. In its evaluation of the plan change, the board identified three areas of concern that applied specifically to the Waitata Reach.³ They were:
- (i) ecological integrity, particularly with respect to habitat for the King Shag
 - (ii) cultural concerns arising out of the identified waka routes on the northeast part of the Reach
 - (iii) natural character and landscape values.
12. Following a discussion of each of these areas of concern,⁴ the board assessed the impact of the proposed plan change on the Waitata Reach as follows.

[1252] After careful consideration of all the balancing factors, we conclude that the siting of four proposed farms in this reach would not be appropriate. The assimilative capacity of the receiving waters and potential cumulative effects on the foraging areas of the King Shag are uncertain. The cumulative effects of the Kaitira and Tapipi [sites] on the natural character, landscape and seascape qualities of the entrance to the Sounds would be high. Further, Tapipi lies in the path of a traditional waka route – a taonga to Ngati Koata. It would also be in the vicinity of recorded sites of significance to Maori.

[1253] To grant all the zones would not give effect to the statutory provisions in respect of natural character, landscape, Maori, or ecological matters. The overall cumulative effects would be high.

[1254] We accordingly grant the request with respect to Waitata and Richmond, but decline the request with respect to Kaitira and Tapipi.

13. Because the White Horse Rock site was not part of the plan change proposal, the overall effects of developing that site were considered after the requests for the plan changes and concurrent resource consents had been considered and decided. In its assessment of the White Horse Rock application⁵, the board declined to grant consent for the site. It summarised its findings at paragraph [1356] as follows:

[1356] We find that the adverse effects on recreational fishing, customary fishing, navigation, natural character, when considered cumulatively with the existing farms and the farms consented would be sufficiently high to tip the balance against granting the application.

Discussion on question 1

14. The NZKS proposal was to establish five new salmon farms in the Waitata Reach. Of the five farms sought, the board granted approval for two of those farms (Waitata and

³ At paragraph [1244]

⁴ At paragraphs [1245] to [1251]

⁵ At paragraphs [1343] to [1357]

Richmond). The remaining three were declined (Tapipl, Kaitira and White Horse Rock).

15. The effect of the board's decision is that it establishes a factual threshold, in the sense that the existing environment for the Waitata Reach must now take into account the two new salmon farms. The effects of any new proposal to establish a salmon farm in the Waitata Reach will need to be assessed against the effects generated by the Waitata and Richmond farms. Further, because there has been a comprehensive review of the effects of attempting to establish a number of salmon farms in the Waitata Reach, and only two were able to be approved, any proposal to establish a further salmon farm (or farms) in the Waitata Reach will need to address relevant aspects of those findings. An illustration of this can be seen in the decision of the Environment Court in the KPF appeal,⁶ which is referred to in more detail in addressing question 3. The Environment Court considered that the board had established a threshold of two new salmon farms for the Waitata Reach and that in arriving at this threshold, the board's findings on relevant overlapping effects were persuasive.
16. It is also arguable that the board's decision establishes something of an ecological threshold, limiting development of any further salmon farms in the Waitata Reach, at least until the two new farms (Waitata and Richmond) are fully established in accordance with the conditions of their resource consents.
17. Those farms are subject to an adaptive management regime to monitor ecological impacts at various levels of discharged feed. The intention through the adaptive management process is to determine whether the environmental quality standards specified in the conditions are able to be met, so as to allow a staged increase in the volumes of feed able to be discharged. The board also imposed a requirement for NZKS to implement a King Shag management plan, consideration of which is a factor in any decision to allow increased discharges of feed at the Waitata and Richmond farms.
18. There is the potential for any new farm establishing in the Waitata Reach to undermine and have a confounding effect on the integrity of the monitoring effort required for the Waitata and Richmond farms. To maintain the integrity of that monitoring effort, it first needs to be established that the Waitata and Richmond farms can operate to the maximum levels of discharged feed authorised under the conditions of consent for the two farms, before any new farm could be allowed to establish in the Waitata Reach.
19. Further, the board's decision in relation to the White Horse Rock site illustrates the fact that the board itself considered that a threshold of two new farms was the limit of further salmon farming development for the Waitata Reach. Because of the order of decision-making adopted by the board, the plan change sites (and their concurrent resource consents) were decided first. When the board came to consider the resource consent application for the White Horse Rock site, it needed to take into

⁶ KPF Investments v MDC (2914) 18 ELRNZ 367

account the fact that it had already granted plan changes and resource consents for the Waitata and Richmond sites. Having made those decisions, the board was not prepared to grant consent for a further salmon farm in the Waitata Reach, and the White Horse Rock site was declined. This included consideration of the natural character and landscape values of the Waitata Reach as a whole.⁷

20. For these reasons, my answer to question 1 is yes.

Question 2

Did the Board of Inquiry consider cumulative effects, including on the natural character of the Waitata Reach in combination with the adjacent bays, or were they identified as separate entities?

21. Paragraph [694] of the board's decision refers to cumulative effects of the five proposed farms *in addition to the existing one*. Paragraph [698] refers to the cumulative effect of the five proposed farms with the other consented farms at Waihinau Bay and Port Ligar. There is also reference to the establishment of marine farms in the more sheltered (and visually less obtrusive) confines of bays at paragraphs [576] and [583], and at paragraph [644] to the fact that there was agreement among the landscape experts that the location and general character of the Waitata Reach *needs to be appreciated in the context of the overall labyrinth of waterways known as Pelorus Sound*. There is then a discussion of this wider landscape context at paragraphs [644] to [651]. However, the board had already identified that the Waitata Reach comprises the body of water that connects Tawhitinui Reach (at Maud Island) to the south with Cook Strait to the north, and that was its focus when considering the effects of the individual farms on natural character, landscape and visual amenity values within the Waitata Reach.
22. My answer to question 2 is that the majority of the board's discussion of effects on natural character, landscape and visual amenity values is directed at the Waitata Reach, and not the adjacent bays. The adjacent bays were considered as part of the landscape context, as outlined at paragraphs [644] to [651], and referred to as contributing to the cumulative effects on the natural character values of the Waitata Reach at paragraphs [694] and [698].

Question 3

If the answer to question 1 is yes, then in the KPF decision did the Environment Court use a threshold established by the board of inquiry to make a ruling for salmon farms in the Waitata Reach?

23. The KPF proposal concerned an application to convert part of a 12 ha mussel farm at the mouth of Port Ligar (Danger Point) into a salmon farm. By a decision dated 21 May 2012 the Council granted consent, subject to conditions. The decision was appealed to the Environment Court, and before the appeal could be heard the board

⁷ See paragraphs [1355] and [1356]

Written Comment No: 0598

of inquiry released its decision on the King Salmon proposal. It was argued for KPF that the effects of the Waitata and Richmond salmon farms should not be considered part of the existing environment. The Environment Court disagreed and stated at paragraph [58] that the cumulative effects of the KPF proposal needed to be considered and concluded at paragraph [61]:

[61] The effects of the proposal on the marine environment will be considered within the existing environment of the full Waitata Reach (extending from Maud Island to the entry to Cook Strait) and Port Ligar. That environment includes the two EPA consented salmon farms at Waitata and Richmond.

24. Accordingly, in its assessment of the existing environment, the Environment Court took into account the Waitata and Richmond farms. A complicating factor in the KPF appeal was whether the board of inquiry had taken into account the KPF consent as part of the existing environment. The Environment Court stated at paragraph [60]:

[60] Mr Hunt submitted that, in any event, the Board did take into account the KPF consent as part of the environment and that there were clear indications of this in the decision. We agree that the Board considered that the KPF consented farm was part of the environment when considering some of the ecological effects of the New Zealand King Salmon applications and in terms of natural character considerations. However, no further references were cited to us in relation to the effects on landscape or tangata whenua values. Nor have we found any consideration of the cumulative effects of the Danger Point salmon farm in the Board's overall 'Evaluation of [the] Plan Change'.

25. In relation to tangata whenua values, the Environment Court stated at paragraph [187]:

[187] The Board of Inquiry considered that four new salmon farms in the Waitata Reach would 'compromise' Maori values 'to some extent' and in particular with respect to water quality as a result of the excess food and effluent, by the like effect on customary food gathering areas, by the potential impact on kaitiakitanga, and in diminution of their relationship with their rohe moana. In this case we had little evidence of the use of the Danger Point coastline specifically, or the reef beyond it for customary food gathering. Mr Buchanan stated more generally that he had dived or snorkelled in the vicinity of reefs in 'Waitata Bay'. However, the other three adverse effects would be likely to occur. We find that the addition of a third salmon farm in or beside the Waitata Reach (in addition to NZKS's Richmond and Waitata farms), or a fourth if the existing Waihinu Bay farm is included, would be a serious adverse effect on the values of Ngati Koata.

26. And at paragraph [209]:

[209] Another aspect which concerns us in relation to s 6(e) of the RMA is the cumulative effect of this proposal in addition to the two existing and the two approved salmon farms in the Waitata Reach and adjoining bays. At some point

Written Comment No: 0598

Ngati Koata's mana moana would be substantially eroded if salmon farms continue to be placed in this part of Pelorus Sound. The NZBOJ considered only two new farms should be allowed in the plan, and we respectfully agree. We hold that the threshold would be exceeded if consent were to be granted to the KPF application.

27. The Court's decision was to allow the appeal with the result that the grant of consent by the Council was cancelled. The Court found that the decision of the board of inquiry to allow only two new farms (at Waitata and Richmond) created a threshold in relation to tangata whenua values, which would be exceeded if the KPF proposal was also approved. This was a decisive factor in the Court's decision to cancel the KPF consent.⁸
28. There were also findings that to allow the KPF proposal would lead to a significant (cumulative) adverse effect on the natural character of the Waitata Reach/Port Ligar entrance⁹, and significant (at the low end) adverse effects on the Waitata/Port Ligar landscapes beyond those of the existing mussel farm.¹⁰ These were also decisive factors in the Court's consideration of relevant matters under section 104, and its decision to cancel the KPF consent.
29. My answer to question 3 is yes, in relation to tangata whenua values. The assessment of adverse effects on the natural character values at the Waitata Reach/Port Ligar entrance was also influenced by the board's findings.¹¹ Although the Environment Court was not strictly bound by the decision of the board of inquiry, it found that the board's decision established a threshold for development of further salmon farms in the Waitata Reach, which the Environment Court found to be persuasive in relation to these values.

Question 4

If the answer to questions 1 and 3 is yes, what threshold number of salmon farms for Waitata Reach was identified in the decision and ruling?

30. For reasons already given, my answer to question 4 is the two farms at Waitata and Richmond.

Questions 5 and 6

If the answer to question 2 is no, which bays containing salmon farms in addition to Waitata Reach were included in the assessment of cumulative effects in the NZKS decision and the KPF decision?

What reasons were used to underpin any such thresholds?

⁸ See paragraph [216]

⁹ At paragraph [154]

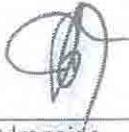
¹⁰ At paragraph [159]

¹¹ See for example paragraph [155]

Written Comment No: 0598

31. See the answer to question 2 in relation to the board of inquiry, and the answer to question 3 in relation to the KPF decision. In the KPF decision, the Environment Court referred to the proposed and existing salmon farms when addressing aspects of the cumulative impact on tangata whenua values (at paragraph [209]), and in its concluding remarks (at paragraph [216]).

Yours sincerely



JC Ironside
Barrister