

Manager, Resource Consents
Marlborough District Council
PO Box 443
Blenheim 7240
Email: mdc@marlborough.govt.nz

Andrew Caddie
President KCSRA
C/- PO Box 5054
Springlands
Blenheim 7241
email: president@kcsra.org.nz
WWW: kcsra.org.nz

Dear Sir/Madam

23 February 2021

**Kenepuru and Central Sounds Residents' Association – Submission on — Variation to the
Proposed Marlborough Environment Plan - Variation 1A: Finfish Farming**

I write in my capacity as President of the Kenepuru and Central Sounds Residents' Association Inc.,
(Association).

1. Introduction

The Association was established in 1991 and currently has approximately 330 household members who live full time or part time in the Kenepuru and Pelorus Sounds. The Association's objects include, among others, to coordinate dealings with central and local government and represent members on matters of interest to them.

The Association is active on a wide variety of issues. These range from: attempting to maintain the security and reliability of the rather stressed local roading network; negotiating with the Marlborough District Council (**Council**) for the installation and/or maintenance of essential public services; and advocating on conservation and environmental issues concerning our marine environment with both regional and central government. In doing so we leverage our limited resources by forming alliances and coalitions with other like-minded local organisations. For more detail of our activities see our web site (www.kcsra.org.nz).

Our rohe sits within the Marlborough Sounds, which the proposed Marlborough Environment Plan (**MEP**) acknowledges is a unique and iconic sea and landscape. We regard it as Marlborough's Jewel in the Crown. The Association believes that, notwithstanding the real difficulties of engaging with central and regional government to say nothing of industry interests, it is an area of such importance for both the current and future generations of New Zealanders that taking an active part in the on-going debate as to what is or is not desirable or suitable and sustainable development is necessary.

An important part of this debate has been the new Marlborough Environment Plan. The Association has participated via submissions and hearings on the MEP as notified by the Council back in 2016. Unfortunately, the MEP process has become most complex as the Aquaculture "chapter" was withdrawn from the notified MEP. The proposed MEP - minus the Aquaculture specific provisions - is now with the Environment Court. So, at this late stage the Council is now endeavouring to merge via variations to the proposed MEP two aquaculture variations – the missing Aquaculture chapter.

This submission addresses what is known as Variation 1A - dealing with the Council's proposals for Finfish farming in the Marlborough marine environment. The focus of our submission is what Variation 1A proposes for the Pelorus /Waitata Reach areas of the Marlborough Sounds.

2. Variation 1A

In a nutshell the Council proposes to create two new fish farm areas (Finfish Aquaculture Marine Areas – FAMAs) in the Pelorus /Waitata Reach areas of the Sounds. One at the entrance of Horseshoe Bay the other at the southern entrance of Richmond Bay. These are to be offered to New Zealand King Salmon Company Limited (NZKS) a farmer of King Salmon (sometimes referred to as Chinook salmon or *Oncorhynchus tshawytscha*). In “exchange” NZKS will no longer be authorised to farm finfish at its Waihinu Bay salmon farm.

The Association submits that, for a variety of reasons, these proposed FAMAs and the associated activities are in inappropriate areas. Accordingly, authorising these two FAMAs as is proposed by Variation 1 A is in breach of the objectives and policies of the New Zealand Coastal Policy Statement (NZCPS) as well as the purpose and principles of Part Two of the Resource Management Act (RMA).

The **Association submits in opposition** to these proposals and believes they should be declined. A primary driver for our opposition is that sea water temperatures in these areas are unsuitable (too warm too often for too long) for the sustainable farming of King Salmon. The Association wishes to be heard at the public hearing and will be represented.

3. Structure of this Submission

Some relevant history (experience): The Association has been actively engaged in assessing NZKS salmon farming proposals for many years. Over that time it has built up a detailed knowledge and understanding of the significant adverse effects of this activity and its unsustainability in the Pelorus and Waitata reach areas. Accordingly it is important to traverse (albeit briefly) our involvement over the years and how we have reached this conclusion via a principled and evidence based analysis.

Precautionary Principle: In any discussion concerning the sustainability/suitability of aquaculture in the Sounds the adequacy and depth of the scientific basis invariably comes up for debate. Accordingly in this regard we intend to briefly note and discuss the importance of Policy Three of the NZCPS, which sets out guidance to adopting a precautionary approach in this situation.

Sea temperatures current and future say no; In terms of our primary driver – the adverse thermocline - we will look at sea water temperature issues and the evidence and other material gathered to date to establish the unsuitability of the proposed FAMAs.

Mortality and Disease: We will then traverse the linkages and effects of adverse thermoclines on NZKS farming activities in the Pelorus. Namely the series of adverse mortality events suffered to date in NZKS farms in the Pelorus/Waitata Reach area and the emergence of two hitherto unknown (too New Zealand) pathogens among the dead salmon.

“Inappropriate areas” From the Council's perspective an important “sign off” for Variation 1A and its suitability is the Section 32 Evaluation report prepared for the Council. We have a number of concerns with the content, tone and direction of this report and will comment accordingly.

Policies and Rules of Variation 1A: We will also comment on the inadequacies and oversights of the policies and rules proposed for Finfish farming in Variation 1A.

Open Water Proposals: Finally whilst not strictly part of Variation 1A (it is contained in Variation 1) we will also comment on what is proposed for the more open waters of the Marlborough marine area (defined as we understand it as CMU 8 in the Management Areas overlay attached to the two Variations) in relation to finfish farming. Germane to these comments is our involvement in the 2019

NZKS resource consent application for a very large salmon farm area (over 17 million square metres) a few kilometres off Cape Lambert and abutting various ecologically significant marine areas.

4. The Association's involvement with Finfish Farming in the Sounds.

By 2010 members were becoming concerned at the seemingly endless tide of marine farm applications in the Kenepuru and Pelorus Sounds without regard to the cumulative significant adverse impacts of these activities on this unique and iconic New Zealand environment.

In terms of Finfish farming these concerns became focused in 2012 when NZKS sought a private plan variation to put nine new salmon farms in areas of the Sounds then prohibited for aquaculture activities. Once up to speed, the Association (and many other community groups) quickly realised the significant adverse impacts of these proposals on the public space making up the iconic Sounds marine environment.

Board of Inquiry: The Association participated in the subsequent Board of Inquiry process (BOI), via which NZKS set out to obtain the additional nine salmon farming locations. The significant adverse impacts in our view vastly outweighed the benefits potentially accruing to NZKS shareholders and the less than minor contribution accruing to the national economy.

The Association with its meagre resources did what it could to debate these unfortunate proposals. The Marlborough District Council **participated vigorously** in the hearings. It retained a number of expert witnesses across a range of specialist fields who argued cogently against the proposal. The then Council thought it important to defend the integrity of its plan against the NZKS onslaught.

The evidence from a senior NZKS employee Mr Gilliard as to key criteria for successful salmon farming was enlightening. He saw seawater temperature as critical criteria¹. To our surprise the Pelorus /Waitata thermocline mapping he put up and talked to indicated that this area was marginal in terms of desirable seawater temperatures. Unfortunately, for whatever reason, in making its decision this admission and its consequences for animal health and disease risk passed the BOI panel by. Concurrently it had emerged that an existing NZKS salmon farm – Waihinu - had suffered an intense summer mortality event. The BOI permitted cross-examination but NZKS expert witnesses were not forthcoming to the Association as to the why or any detail of this event.

Supreme Court: EDS and Sustain Our Sounds (a coalition of local environmental groups) appealed the BOI decision to grant four new salmon farms all the way to the Supreme Court². This hugely important Supreme Court decision from a legal viewpoint resulted in three new farms, two in the Pelorus Sound (Waitata and Kopaua) and one in Tory Channel. We thought that was that. **We were so wrong.**

You can imagine our members' annoyance when it turned out that almost immediately following completion of the BOI process and this ground breaking litigation it transpired that the Ministry for Primary Industries (MPI) and NZKS started collaborating to claw back what the BOI process had failed to deliver³. Part of this process involved an MPI convened Marlborough Salmon Working Group (MSWG).

¹ The excerpt below is from NZKS's Mark Gillard's Site Selection and Consultation Document.²

"Key matters for consideration in selecting possible salmon farm sites

20. Based on my experience, there are two overarching critical matters to consider in determining whether it is feasible to farm salmon productively:

a. The first critical matters are the key appraisals of the physical characteristic required for salmon to successfully grow (rather than perform poorly or possibly die). These are primarily:

i. Water temperature - salmon prefer cooler waters and usually grow best in water temperatures between approximately 12 to 17 °C;

² EDS v NZ King Salmon [2014] NZSC 38

³ Heads of Agreement (HOA) between MPI and NZKS dated 6 November 2015.

Marlborough Salmon Working Group: Two Association committee members agreed to attend the MSWG meetings and wade through the detail. They were led to believe that the thrust of the MSWG deliberations was to consider options whereby the existing NZKS salmon farms in the Sounds adopt the Best Management Practice guidelines recently developed. Very quickly it became apparent to our and other community representatives that the real objective of MPI was quite narrow and something different. That is, to justify via a so-called relocation approach to create a number of new farm sites for NZKS in areas currently prohibited for salmon farming. Community representatives worked hard to “turn the MPI ship around” to little effect. Various community MSWG representatives on several occasions documented their concerns to MPI and the then Minister⁴.

Notwithstanding this dissent MPI in due course produced a report in late 2016 recommending what they labelled a relocation proposal. This cynical approach is exemplified by the fact the process was labelled a “like for like” relocation proposal. A misnomer at the most basic level. For example three of the farms proposed to be part of the give and take of the “relocation proposal” had not been operational for a number of years.

Section 360A of the RMA: This time around MPI, NZKS and the then government were determined to avoid allowing even a semi-independent decision making body such as a BOI to be involved. Such an approach it seemed was “too uncertain” as to outcome. Accordingly MPI advocated the use of sections 360A to C of the RMA. In essence this is a ministerial decision making process (via the Ministerial regulation making power created under S360 to 360C) that sidesteps the usual plan change processes. Fortunately for the environment, the proposed legislative route is not entirely a blank canvas for the Minister (aided by officials) to decree what they think fit. Section 360B of the RMA sets out a large number of matters the Minister must have regard to or be satisfied with before he or she procures the promulgation of regulations amending the Marlborough plan under Section 360A.

The Panel: As part of this process the then Minister convened a Panel (the Marlborough Salmon Farm Relocation Advisory Panel (**Panel**)) to take submissions and hear expert evidence on six new proposed sites, the majority (five) to be situated in the Waitata/Pelorus Sounds area. The Panels mandate was carefully circumscribed by a set of Terms of Reference with a heavy focus on the clear desire of MPI and the Minister to have confirmation that this proposal was in accordance with the then Government’s policy for aquaculture in the coastal marine area. MPI commissioned a range of expert advice. However pursuant to the agreement between NZKS and MPI this evidence was to be paid for by NZKS and NZKS would have a major say in the selection of the experts⁵. The Association was thus not surprised to see the MPI experts included a number who had been retained by NZKS at the BOI.

The Panel’s report: The Association decided, given the clear adverse effects from this proposal, it had no choice but to participate in this one sided process and obtained expert advice in conjunction with other community groups on likes of adverse impacts on Landscape and Natural Character values and the insignificant economic value of the proposals for the Nelson and Marlborough regional economies⁶. We also deployed what we had learnt since the BOI on the adverse impacts of sea temperatures and disease and mortality related events⁷.

In relation to the latter point the Panel largely dismissed these concerns on the grounds it had not received any evidence as to long term sea temperature rises in the Pelorus Sound⁸. Indeed the cry from

⁴ This correspondence trail can be seen on the KCSRA website (www.kcsra.org.nz, click on “Public Documents” and then the folder labelled “New Salmon Farms”). Alternatively try:

<http://kcsra.org.nz/documents/salmonFarmMortality/160604%20KCSRA%20Paper%20-%20%20Salmon%20Mortality%20in%20the%20Pelorus%20-%20Why.pdf>

⁵ Clause 3 of the HOA referred to above.

⁶ KCSRA Expert Evidence – “Economic review of NZ King Salmon Relocation Proposal” - Offen Advisors Ltd – March 2017.

⁷ <https://www.mpi.govt.nz/dmsdocument/17215-Kenepuru-Written-comments-on-salmon-relocation-proposal>

⁸ See page 119 of the Report and recommendations of the Marlborough Salmon Farm Relocation Advisory Panel of July 2017.

<https://www.mpi.govt.nz/dmsdocument/27447-Report-and-Recommendations-of-the-Marlborough-Salmon-Farm-Relocation-Advisory-Panel>

NZKS was that the targeted areas (like the new BOI sites) were fast flow and cool sites that would do away with such concerns.

The other important point to note in the context of Variation 1A is that this time around the Council was now a **most reluctant participant** in the Panels proceedings and submitted a short (seven pages) rather perfunctory submission.

In any event, predictably enough, the Panel's report of July 2017 recommended the Minister proceed with "three new high-flow sites" – Two (Richmond Bay South and Horseshoe Bay) in the Waitata Reach/Pelorus area. Following a change in Government the report and recommendations have, appropriately, languished. We thought they may have been consigned to the dustbin of history but unfortunately the Council has used the Panel's report as a short cut to formulate Variation 1A on the basis that the technical expertise and research that informed the Panels research is the most current. Not so and more on this later.

NZKS Waitata Extension Application: The Association along with other community groups contested a poorly thought out and deeply flawed 2019 application by NZKS to extend its Waitata farm pen area from that granted by the BOI. This was against a background of two severe mortality spikes in NZKS Pelorus farms linked to warm sea temperatures over the summers of 2017/18 and 2018/19. In due course the hearing Commissioner declined the application⁹.

As part of the BOI process a carefully structured set of consent and monitoring conditions was put in place for this farm. In the course of this application submitters were appalled to become aware of how NZKS had, through a series of non-notified applications, been carefully dismantling aspects of the BOI set consent and monitoring conditions as its farming operations suffer setbacks. This mind-set has critical importance when we discuss the light handed policies and rules around monitoring and associated consent conditions proposed by Council in Variation 1A.

Another area the application highlighted was the blanket of secrecy that NZKS, with assistance from MPI, had thrown over mortality figures on a farm basis held by MPI. Information requests to MPI were declined on the basis of commercial confidentiality. Nothing daunted the Association deployed some of its in-house analytical skills to estimate the mortality figure based on the likes of publically available feed discharge data. The hearing Commissioner invited NZKS to comment on this mortality estimate for the Waitata farm but no comment was forthcoming¹⁰. More on this aspect later.

The application also highlighted and documented the alarming structural engineering difficulties and mishaps NZKS was experiencing in what it regarded as a high flow site.

Cape Lambert near shore farm application: With some fanfare NZKS announced in 2019 it was taking the hint and looking to move "off shore" with an application for a massive 17 million square metre farm area and projecting up to 80,000 tonnes of feed discharge if all went well. NZKS stated the project was "shovel ready". Again the Association (and other community submitters) was surprised to find just how undercooked the application was and the reckless disregard it seemed to take to the possible adverse effects on nearby ecologically significant marine sites (e.g., McMannaway Rock). Then there is NZKS's poor track record in more benign operating environments of structural engineering issues and lackadaisical regard to harbour master concerns. Submissions closed in December 2019 but at the time of writing NZKS has not progressed this application.

Other NZKS consent variation applications: In late August 2020 NZKS made a number of other consent applications seeking to vary what it sees as irksome consent conditions on, among others, the Waitata farm. We and other concerned community groups have submitted on the same. However notwithstanding NZKS's original fast track hearing timetable, at its request, this has been pushed back to June 2021 as it attempts to address submitters concerns.

⁹ 20200313 Decision Document re U190357 Waitata farm dated 13 March 2020 - PDF available on the MDC website.

¹⁰ See paragraphs 108 and 109 of the above Decision Document.

The above gives a reasonable feel for the hard won experience and expertise the Association has garnered on NZKS Salmon activities since 2012 which is of much relevance given our critical comments on Variation 1A.

5. The NZCPS and the Precautionary Principle

Over the years when one deals with scientific evidence as to the existence (or not) of adverse cumulative effects from an activity then one is struck by the oft repeated call that we cannot be sure that the adverse effect is that bad. Really, so it is often implied, we need to do more work before we can be confident, or state emphatically, that the adverse effect can be quantified in this or that way and thus should be avoided. In many ways this approach seems to take the view that the degree of proof required in the RMA context is that of beyond reasonable doubt rather than on the balance of probabilities.

Fortunately Parliament has been quite directive on this (for scientists) thorny problem. The New Zealand Coastal Policy Statement (NZCPS) at policy 3 (1) is quite directive on this issue, *“Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown or little understood but potentially significantly adverse”*.

By way of further example in her last publication as the Parliamentary Commissioner for the Environment Ms Wright when considering how best to look at what the precautionary approach required noted *“in other words, when it comes to the environment full scientific certainty will always be elusive and we cannot prevent environmental degradation without taking action.”*¹¹

In the context of Variation 1 and 1A the Association submits that Policy 3 needs to be read with Policy 11 (protection of indigenous biodiversity in the coastal environment) firmly in mind.

6. Sea Water Temperatures trends in the Pelorus

As previously noted the BOI process brought to our attention the likelihood of elevated summer seawater temperatures preventing sustainable farming of King Salmon in the Waitata/Pelorus area. Concurrently there was a significant mortality event at an existing NZKS farm – Waihinau. We decided to investigate matters further¹².

One of the outcomes has been our monitoring of seawater temperatures using Council-monitoring data. Bearing in mind the upper range of the preferred temperature we attach as Schedule One a graph showing seawater temperatures at the monitoring point at the Pelorus entrance (Post Office point). Note the time the temperature sits above the 17 degree bound. We put a similar graph to the Panel.

The Panel’s view on Climate Change: However as noted the Panel back in 2017 decided that it had received no empirical evidence as to long term sea water change as a result of climate change or otherwise and thus could not see an issue for the proposed activities. As can be seen from the Schedule One graph, Nature, in the following summer (2017/2018) slammed the issue home with a pronounced temperature spike. Some commenters were keen to label this event as an abnormal one off event. So again Nature rubbed the point home with another elevated seawater temperature spike the following summer (2018/2019). The point is of course that even on a medium term basis the area is inappropriate for additional salmon farms - contrary to what Council and Variation 1A assumes.

Latest Science – Warming Sea temperatures: To put adverse thermocline matter in further focus, we note a very recent refereed scientific paper in the New Zealand Journal of Marine and Freshwater Research. The authors directly attempted to identify trends in terms of sea temperature rise in Pelorus

¹¹ *“Taonga of an island nation: Saving New Zealand Birds”*: Parliamentary Commissioner for the Environment, 2017, page 96.

¹² KCSRA members made OIA requests and compiled data on the salmon mortalities in the Waihinau farm, which resulted in the paper: *Salmon Mortality in the Pelorus – Why?* Added to this submission as Schedule 2.

Sound over the period 2002 – 2020¹³. The paper concludes in its discussion at page 12 that the data sets reviewed provide **convincing evidence** that the waters of the Pelorus Sound have warmed over the study period. The paper notes further that summertime water temperatures in the Sound already climb above those at which King salmon exhibit symptoms consistent with thermal stress and additional warming will further reduce the suitability of these waters for salmon farming.

We draw attention to the requirements of section 7(i) of the RMA on this topic. This report should, we submit, raise a vivid and large red flag visible to all but the hardened climate change denier.

Conclusion: The Council is **wrong** in arguing that the Panel's views are the latest and greatest word on matters concerning the viability and appropriateness of salmon farming in the subject area. Accordingly the Council should have not adopted the report's four-year-old recommendations without further detailed examination. The Council's approach in Variation 1A is thus, we submit, wrong operationally and at law.

Rather than wait for another decade or so to see what happens, we submit that Policy 3 of the NZCPS requires a precautionary approach and thus more FAMAs in the Waitata/Pelorus as Variation 1A currently proposes **should not be authorised**. We discuss further the impacts of the adverse thermocline on NZKS farming activities in the Pelorus/Waitata Reach in the following section.

7. Placement of FAMAs in Inappropriate Areas – Mortality and Disease risk

Since 2012 the Association's journey as a result of NZKS's fanatical ambition to massively scale up its activities in the Sounds has been one where NZKS, its experts and central government advocates spin a tale of "*all will be well*" and look away when it transpires that it is not.

Now we have the Council adopting without any real examination the recommendations of the advisory Panel report whose myopic view of the existence and consequences of unsuitable current sea temperatures (and likely rising ones) were exposed within a short time of the release of its report. Of particular note has been the saga of disease and fish mortality spikes as Nature rams home the fact that in the medium term any further increase in King Salmon farming in the Waitata Reach and Pelorus Sound is **inappropriate**.

We briefly traverse the steps leading to this conclusion.

Research: In 2012/13, understandably, KCSRA became concerned at the reputational risk to the Sounds in terms of this unique and iconic area being associated with large fish mortality events and this risk being enhanced as a result of the ramped up NZKS proposals. We were also nervous about the disease risk spilling over into other areas or other species. Given the reluctance of NZKS experts at the BOI to meaningfully address the media reports of a significant mortality spike at its Waihinu farm the Association decided to dig a little deeper.

Data Requests: Initially, KCSRA sought answers as to the cause and extent of the mortality spike from the bio-security regulator – the Ministry for Primary industries (MPI) via the Official Information Act (OIA). Answers to a number of our requests were declined by MPI. Commercial sensitivity was the main line of push back.

The mortalities spikes keep coming: In 2015 another mass mortality event was reported by the media, again at the NZKS Waihinu farm in the Pelorus. Again very little concrete information/analysis was supplied to the general public by MPI. Again the Association sent OIA requests to MPI, trying to find

¹³ Niall Broekhuizen, David R. Plew, Matt. H. Pinkerton & Mark. G. Gall (2021): Sea temperature rise over the period 2002–2020 in Pelorus Sound, New Zealand – with possible implications for the aquaculture industry, New Zealand Journal of Marine and Freshwater Research, published online in January 2021 - DOI: 10.1080/00288330.2020.1868539

out what was going on, and if this was going to become the new norm. Again, “*commercial sensitivity*” was cited as a reason to withhold information.

What did MPI do?: Given this background and the interest shown by some members, KCSRA formed a small working group to carry out our own research and analysis to get an understanding of the root causes of NZKS salmon dying en masse in the Marlborough Sounds on a regular basis. Over time we also endeavoured to get closer to MPI biosecurity.

Coincidentally, MPI biosecurity decided to issue from 20 April 2016 a Controlled Area Notice (CAN) and a series of Notices of Direction (**NOD’s**) under the Biosecurity Act 1993. The CAN puts in place movement controls and procedures over the Outer Pelorus and Queen Charlotte Sounds to contain the spread of these pathogens. MPI also required regular mortality data on a farm basis from NZKS¹⁴.

This struggle to get to the bottom of this matter lead to the preparation and circulation in mid 2016 of a KCSRA Technical paper by the KCSRA working group referred to above. That paper is **attached as Schedule Two**.

MPI Reports – New Pathogens in the morts: At some point, MPI convened a technical advisory group who audited /visited various NZKS sites and produced a report¹⁵. MPI in due course (May 2017) also produced a summary Intelligence Report¹⁶. After a little prodding we obtained copies of each report.

Disturbingly, the reports revealed that analysis of mortalities from several NZKS Sounds farms confirmed the hitherto unknown to New Zealand, possibly causative pathogens and in particular the Rickettsia like organism (NZ-RLO). These reports highlighted a lax and casual NZKS operational and management style. Although the Advisory Panel hearings had finished by then, we took steps to make sure the Panel was informed of the MPI reports.

The Panels Indifference: Disappointingly the Panel (page 86 of its report) could not see the relevance of these events and consequential technical reports. Amazingly the Panel was of the view that they did not touch **at all** upon the suitability of the proposed new sites for the same activity.

In essence the Panel was confident that the new BOI sites and the proposed new farm locations they were now recommending in the Waitata Reach/Pelorus were the desired high flow cool sites that would not suffer these events. Unfortunately this “blind eye” approach ignores a physical fact. The water temperature is more or less the same everywhere in this area.

As noted, almost immediately the Panel’s confidence that cool high flow sites would solve any issues **was proved wrong**.

More Mortality Spikes: Based on our ongoing monitoring of sea temperatures we were aware that the summers of 2017/2018 and 2018/2019 produced higher temperatures for a longer period. Media reports confirmed mortality was high¹⁷. By this stage NZKS was a listed NZX company and some overall mortality data was publically available. Not farm specific though.

¹⁴ MPI Notice to NZKS to supply Information under S43 of the Biosecurity Act 1993 dated 12 October 2015.

¹⁵ Report of the Technical Advisory Group Meeting, Wellington, December 2015 – Response Title: NZLRO & *T. maritimum* 2015- Report Date 3 March 2016.

¹⁶ MPI Intelligence report- NZ-RLO & *T. Maritimum* 2015 response – MPI Technical paper dated May 2017.

¹⁷ We also recently obtained via the OIA process records of dead salmon dumped at the Council waste disposal facility which suggest around **2300 tonnes** between 2018 and 2020 of dead NZKS salmon were so dumped. In addition we understand NZKS may be disposing of quantities of morts at a composting facility and possibly via pet food production. At one stage NZKS was using dead fish in the production of burley (used by recreational fishers to attract fish) but this was stopped by MPI in its NOD dated 18 July 2016 and then only allowed under strict guidelines via a NOD dated 1 November 2016.

Based on experience to date we thought it was unlikely that details of these mortalities at the BOI farms in the Pelorus /Waitata areas would be forthcoming from MPI - due to commercial sensitivity. However, having such information was, we thought very important for a 2019 consent variation application by NZKS to, among other things, increase the number of pens at its Waitata Farm. We could see that such an extension would, in due course pave the way to feed increases, despite NZKS needing to farm less salmon not more at Waitata.

KCSRA Waitata Mortality Calculation: In order to address this lack of information as to what the current mortality rates for the Waitata farm might be in fact (and thereby work back as to the appropriate feed discharge /fish densities levels on a per pen basis) might be the Association was forced to do its own calculations. Our in house analyst garnered whatever publically available data (feed discharge reports held by the Council, overall mortality figures from NZKS releases etc.) she could pull together. Using this approach we calculated a mortality rate at the Waitata Farm. At the hearing we presented our assumptions and detailed calculations.

We arrived at the **alarming figure of 41.8% mortality** for the FY 2019 (June 2018 to June 2019). As noted the hearing Commissioner gave NZKS the opportunity to review and comment the next morning. As the decision records NZKS did not take this offer up. We submit we are in the ballpark. These mortality events and the associated risks of disease clearly demonstrate that the Waitata Reach/Pelorus area is **not an appropriate** area for any new FAMAs as the Variation proposes. Variation 1 A needs to be amended accordingly.

8. Potential Impacts of More Salmon Farming on the Scallop Resource

In terms of Policy 11 (protection of indigenous biodiversity) of the NZCPS we note the new proposed FAMAs are in an area containing a nationally significant example of an indigenous species under threat - the Sounds scallop resource. We submit Policy 11(a) requires the adverse effects of activities on indigenous biodiversity such as from salmon farming to be avoided. Marlborough scallops are also a species that fits the criteria of being important for recreational, commercial, traditional or cultural purposes. Policy 11(b) requires, we submit, that significant adverse effects on the habitats of species such as scallops from increased salmon farming as proposed by the Variation is to be **avoided**.

We briefly traverse the Associations on-going involvement in trying to stem the unsustainable decline of this resource.

Scallop Strategy Document: Since the alarm bells rang in 2014 the Association has put a considerable effort into trying to save the rapidly declining Sounds resource going the way of the once large (but now collapsed) scallop resource of Golden Bay and Tasman bay. Our efforts and that of other committed community groups lead to the Ministerial creation of the multi sector Southern Scallop Working Group (SSWG) and the preparation by SSWG of the Southern Scallop Strategy – Marlborough Sounds (**Strategy**). The Strategy's aim is ensure the rebuild of the resource. After a period of public consultation the draft was finalised and circulated in July 2020. The SSWG is close to completing an Implementation Plan.

Link to the RMA: The Strategy is a fisheries plan under section 11A of the Fisheries Act 1996. Pursuant to section 66 of the RMA entities such as the Council are required to have regard to it when making or varying plans such as the MEP.

In our submission to the Panel we noted the adverse effects of the then subject proposal on the scallop resource under various headings such as significant adverse water column effects, disease risks and adverse recreational impacts. We submit that the same issues are still present.

Section 66 of the RMA: What is disappointing is that the Council, in stating that the Panels bundle of MPI supplied expert evidence etc. was the final word, has seemingly ignored its statutory obligation to have regard to the Southern Scallop Strategy. Accordingly we will briefly cover how the current proposal envisaged by Variation 1A will adversely impact on the scallop resource in the FAMAs vicinity and how these adverse effects can be avoided.

The adverse impacts of intensive salmon farming on the struggling Sounds scallop resource manifest itself in at least two ways. As discussed above the clear potential for salmon farming in inappropriate areas is to create a disease rich holding pool as regular adverse thermocline events stress the fish and in turn provide a pathway for pathogen to flourish. Secondly, nutrient loadings in the water column from the activity are likely to have an adverse effect on scallops and their habitat.

Additional Feed Discharges: The nutrient loadings come off course from the Salmon faeces a by-product of the feed discharges. Based on feed levels proposed in the last proposal for these FAMAs (and the average feed discharge at Waihinau) we estimate¹⁸ a net 5300 to 7300 tonnes of feed discharge into this relatively small area from what is now proposed in Variation 1A. This is approaching **double** what is currently permitted re the existing Waitata and Kopua BOI farms. We submit the cumulative adverse impacts (bearing in mind the existing salmon farms in the close proximity) will be significant.

Ketu Bay (a little to the north of the two FAMAs) was not so long ago (2009) renowned for its bountiful scallop beds. They were much-treasured recreational and customary sources for these fish. These beds have been reduced to record low levels and despite of several years of closure to fishing effort they have not improved. Based on NIWA biomass surveys Ketu has continued to deteriorate.

Disease link to Salmon? MPI have formally confirmed¹⁹ that there are several disease inducing organisms including Rickettsia-like pathogens present in the diseased shell fish. In light of the discovery of the NZ- RLO(*Rickettsia like organism*) in salmon morts following adverse thermocline events we submit the issue of disease transference cannot be ignored as the risk will increase exponentially with the proposed increased concentration of salmon farms.

Nutrient loadings from Salmon Farming: We also underline that one of the causes MPI has identified in this report is “nutrient loading”. It should not escape notice that Ketu Bay (and Richmond Bay also once home of a scallop resource) is in close proximity of the proposed new sites. We are assured that the waste from these two proposed farms might also track outwards. And yes there is also the existing waste flow from the two BOI farms. The Kopaua farm is located on the headland between Ketu Bay and Richmond Bay.

In terms of other causes, sediment loadings from other activities coming in via the Pelorus River (eg dairy, forestry harvesting) should not, it is submitted, be much of a factor this far out in the Sounds and given the (now) low level of any proximate land-based farming/forestry activities²⁰. Rather, it is submitted that on the balance of probabilities, the nutrient loading from the BOI farms are having a deleterious impact on this indigenous resource. It is submitted that it is almost inevitable that if what is proposed by Variation 1A goes ahead, the significantly increased nutrient loadings from the two new FAMAs will adversely impact in a significant way on this and other shellfish and fish species spawning grounds.

NZCPS: Accordingly, the FAMAs proposed by Variation 1A seem likely to be in breach, of Policy 11 of the NZCPS. We submit the application of the **precautionary principle** is required and the FAMAs proposed not be authorised.

9. Part 2 of the RMA

The Association submits that authorising the two new FAMAs into this area is **inappropriate** given what we know about the existence and significant adverse effects of adverse thermoclines on the activity is in breach of various aspects of Part 2 of the RMA.

We submit that authorising this activity in this context does meet section 5 of the RMA (Purpose).

¹⁸ KCSRA is happy to provide details of those calculations

¹⁹ For a copy of this short report go to www.kcsra.org.nz, click on the folder called Public Documents, then the folder “Scallops” and open the report dated 24 Nov 2015.

²⁰

We have set out the basis that the creation of these FAMAs are in **inappropriate areas** and accordingly submit they are in breach of Section 6(a) (preserving the natural character of the Coastal environment from inappropriate use and development), Section 6(b), Section 6(c) (protection of areas of significant indigenous fauna) and Section 6(h) (management of significant risks from natural hazards).

In similar vein we fail to see how the Council's statutory obligation to have particular regard to ethical stewardship under Section 7(aa) of the RMA can possibly be appropriately discharged by authorising these two FAMA's and submit accordingly.

We note the requirements of Section 7(b) of Part 2 of the RMA. Surely, encouraging an activity in an area that is physically unsuitable and generates a number of consequential adverse effects on the environment cannot we submit be an efficient use and development of natural and physical resources.

In short there are many breaches of the requirements of Section 7 by the proposed creation of these two FAMA's.

10. Policy 8 of the NZCPS

The section 32 report accompanying Variation 1A suggests it will help the Council give effect to Objective 6 and policies 6 and 8 of the NZCPS.

These parts of the NZCPS essentially attempt to give guidance when addressing the tension between protection of the coastal environment, and other social, cultural or economic benefits from development in the coastal environment. Overall the objectives and policies of the NZCPS are, of course, protective of the unique and iconic marine environments such as the Sounds.

Thus Objective 6 talks about development in the coastal environment in the context of it being in appropriate places and within appropriate limits. Policy 8 requires decision makers such as the Council to *recognise* the potential contribution of aquaculture in the likes of the MEP but it has an important caveat. Where a plan such as the MEP makes provision for aquaculture it should do so in appropriate places.

As we see it that would include an assessment as to the likely difficulties the operating environment presents for aquaculture activities in a given area. As we have outlined above it is clear that the existing salmon farm operations in the Waitata/Pelorus area have been located in an area where sea temperatures are regularly significantly adverse for this activity. The science suggests the medium term outlook is for this aspect to get worse. In any event this difficulty already results in regular and significantly elevated mortalities. Salmon farming in this area is clearly providing an environment suitable for the growth of hitherto unknown (to NZ) pathogens.

Whilst NZKS may wish to struggle on with its new BOI farms gambling that every so often the summer thermoclines will go its way it is not, we submit, supportive of the social or cultural wellbeing of the rest of the community to argue we need to "double down" by adding two new FAMAs as Variation 1 A proposes given what we know already.

We submit the new FAMAs proposed by Variation 1A are manifestly in inappropriate places and thus breach the requirements of Policy 8 and Objective 6 and should not be authorised via Variation 1A.

11. Government Aquaculture Policy

In mid September 2019 the then Government (Minister Nash) released with some fanfare a new Aquaculture Policy. It sets out very ambitious financial targets for the sector. At writing the Association is unclear as to its legal weight in terms of the MEP although we suspect it has little. The section 32 report to Variation 1A makes only a brief mention of it. However, we are confident that the Association's submission rejecting the two FAMAs is quite in keeping with the tone and tenor of the said policy.

Association's submission rejecting the two FAMAs is quite in keeping with the tone and tenor of the said policy.

As even a quick skim will attest the clear intent of the policy is that the financial and production targets be achieved on a sustainable basis. We are confident that placing the new FAMAs into areas where the thermoclines are clearly unfavourable so as to significant mortality events and significantly increase the risk of disease and biosecurity issues is not sustainable nor in keeping with the intent of the likes of Outcome 3 (protection from biological harm) of the policy.

12. Water Column and Benthic Issues

The Waste output: King Salmon farms are highly polluting activities. Approximately for two tonne of feed discharged into the pens the farmer hopes to gain one tonne of production. The other tonne is largely discharged as faeces. As we calculate it what is proposed for the Waitata /Pelorus area will result in a net feed discharge increase of 5000 to 6500 tonnes. One way of measuring the scale of this discharge is to compare it to the nitrogen input from human sewage. At the BOI this was accepted as a valid comparison (page 138 of the BOI report). At this point in time we have not done the calculation but note it will be significant. In any event this waste goes into the water column and the surrounding benthic.

The NZKS compliance record: In terms of the permitted BOI farms NZKS has in recent times failed to meet the carefully crafted consent conditions around mitigating these adverse effects. MDC has recently (September 2020) issued an Infringement notice for the BOI Kopaua farm for permitting the discharge of a contaminant (feed) in an unpermitted manner.

The hearing Commissioner in a recent application concerning the BOI Waitata farm noted that the monitoring reports clearly showed it was not meeting the permitted discharge footprint requirements of condition 39 of the resource consent²¹. At writing we are communicating with Council to get to the bottom of its compliance reaction to this breach. We will discuss this further at the hearing. In any event the Council have also issued a cautionary letter to NZKS over breaches of condition 40 dealing with a failure to comply with various applicable Environmental Quality Standards at Waitata.

We are also seeking details from Council in relation to an infringement notice for the Forsyth Bay farm. In passing we note that this is a farm site with a highly problematic environment and compliance record and are surprised that the Council sees it appropriate to authorise its continuing operation.

We understand other submitters will be dealing with the adverse impacts on the benthic and water quality given what is proposed in Variation 1A but wish to note the compliance record as clearly showing NZKS is already at the limits in this area and the cumulative impacts of introducing higher levels of feed discharge from the two new proposed farms should not proceed.

The proposed Policy 13.22.10 for managing the adverse effects of finfish farms is quite disappointing, as to detail and contents. This Policy is further addressed in **Schedule Three** of this submission.

13. Natural Character and Landscape Issues

The main body of the MEP is proceeding to the Environment Court stage. A whole series of mediations concerning the controversial Landscape and Natural Character characterisations of the MEP (and the Waitata /Pelorus area in particular) have yet to get underway. Variation 1A now, at this late stage, raises we submit significant issues in terms of more than minor adverse Landscape and Natural Character impacts. In particular, we have concerns in relation to the likes of NZCPS Policy 13(1), Policy 15(a) and/or (b). The Council has created a complex and messy situation with having the body of the MEP proceed independently of the Variations when in fact they are very interwoven. We note the suggestion of other MEP submitters that the MEP process re Natural Character and Landscape be

²¹ 20200313 Decision Document re U190357 Waitata farm dated 13 March 2020 see paragraphs 93 and 143 - PDF available on the MDC website

halted until the Variations "catch up". This approach has we submit merit. Accordingly, at this stage we intend to reserve our position and will develop it further as the parallel Environment Court process and the hearing of Variation 1A proceeds.

However we wish to record by way of example that in terms of Natural Character, Horseshoe Bay is known for significant reef structures (biogenic zone) at both sides of the northern entrance and submit that these natural structures and associated biological communities contribute significantly to the Natural Character attributes of the area. It seems inevitable that waste from the proposed FAMA will create significant adverse effects on these sensitive areas and rather than "suck it and see" as the Panel proposed we submit it should be avoided as Policy 13 of the NZCPS requires and the authorisation not proceed.

14. The Policies and Rules proposed by Variation 1A

As can be seen from the above the Association is opposed to the creation of the two FAMAs at Richmond South and Horseshoe Bay on the grounds they are clearly in inappropriate areas. However, for completeness sake we briefly review and comment on the general policies proposed by Variation 1A notwithstanding our opposition to the specific FAMAs proposed.

Policy 13.21.7: Variation 1A proposes to add some Finfish farm specific clauses to the rest of this policy as set out in Variation 1. In order to reduce confusion we recommend the title to this policy be changed to read "Authorisation Methodology – AMAs and FAMAs". In similar vein we recommend the reference to marine farming in 13. 21.7(h) be changed to "finfish marine farming". We note there appears to be an ambiguity between the use of "same space", consented area and the definition of marine farm (Variation 1).

Sub clause (h)(ii) is the proposed allocation of new FAMAs in Horseshoe bay and Richmond South. As noted above the Association opposes this allocation on the grounds that these are inappropriate areas for new FAMAs and accordingly recommend the deletion of the references to Waitata Reach CMU and Maud Island CMU in this sub clause.

As we understand it this cause (h) (iii) deals with situations where for whatever reason Finfish farming in a FAMA (existing or new) is not taken up or continued. The suggestion is to put it out for tender and re-purpose for non-finish marine farming. The preferred locations for finfish farming in the Waitata Reach and Tory Channel since 2010 have all been in areas that were zoned Prohibited for Aquaculture under the MSRMP. If space in such a FAMA (Waitata, Kopaua farm) becomes available for reasons mentioned in sub clause (h)(iii), the corresponding FAMA should be removed altogether. It should not be put out to tender for non-finish marine farming. If an existing finfish farm is situated in an ONFL area under the MEP (eg the Ruakaka farm) the FAMA should not even be created. If an existing farm is in an inappropriate area for a FAMA, such as the Forsyth Bay salmon farm which we submit is too close to the Duffers Reef King Shag colony (nor is it viable operationally) , it should not be continued with or be repurposed as suggested. These historical errors when siting marine farms should not we submit be "grandfathered" into the future.

Policy 13.21.10: An important policy that gives the Association real concern. Accordingly, as noted please refer to Schedule Three for our detailed comments.

Policy 13.22.11 of Variation 1A: The Association found this policy a little confusing. This Policy has no short title indicating its content. It seems intended to impose the monitoring of adverse environmental effects of the benthic and water column, as well as the maximum effect thresholds as a consent condition of existing marine farming consents as soon as practical. The thresholds are those of Policy 13.22.1 in Variation 1 (conventional longline structures in enclosed waters) and Policy 13.22.10 in Variation 1A (finfish farms).

The Association understands from reading the above sentence that the thresholds of Policy 13.22.1 are also applicable to finfish farms. On the face of it This is to be applauded, as it includes the monitoring

of free sulfide levels in the seabed sediments. Policy 13.22.10 stops short of even mentioning the monitoring of free sulfide levels or thresholds for free sulfide levels.

After a careful read of Policy 13.22.1, it appears from the description that Policy 13.22.1 is only meant to apply for marine farms using longlines. Hopefully Council will sort its thinking out here. Accordingly we **reserve our position** to comment further once the drafting is confirmed. In passing we note in the commentary to Policy 13.22.11 there is mention of the environmental quality standards (EQS). Where have these have been defined for finfish farms?

15. Open Water Finfish farming and Policy 13.21.16 of Variation 1

Context: It needs to be stressed that the Association has now had some experience with evaluating NZKS's capabilities against its undoubted huge aspirations in terms of more open water salmon farming. We refer to its application for a massive 17 million square metre salmon farm consent area a few kilometres off Cape Lambert. At launch the NZKS spin was that it was "shovel ready" and could be in the water in less than a year. Bear in mind even stage one was for 20,000 tonnes of feed discharge (an anticipated production significantly greater than what NZKS does now in a very good year) with a vision of moving to 80,000 tonnes of feed discharge (an anticipated production 5 times the current NZKS production). The submission process revealed to the Association just how lightweight and unacceptably "*leave it to us and we will get it right in due course*" the NZKS application was. Naturally things have gone rather quiet.

Undercooked: Accordingly, our immediate impression was that proposed policy 13.21.16 was rather undercooked by the Council for such a new and relatively untested endeavour with all sorts of significant environmental and reputational risks. In essence this policy seems to be trying to run two very different activities into one policy. One finfish farming – an artificial feed input model - and the other bivalve or water column filter feeding shellfish. The narrative provides only a modicum of assurance in suggesting that all applications for marine farms in the "offshore CMU" are a full discretionary activity.

We were **very** disappointed that the policy section of Council had not attempted to learn from what it could have gleaned from the recent declined Waitata farm extension application and the extant Cape Lambert application and used these leanings to provide detailing a set of robust requirements. For example the necessity for the finfish farm structures to be even more robustly engineered than bivalve farms given their pen layout and the high-energy waters they might be located in does not seem to get a mention.

With all due respect we do not see Policy 13.22.7 (e) of Variation 1 with a passing reference to the soft standard of merely "adequate anchoring" does any justice to the high energy environment of our open waters. As far as we can ascertain the rules are totally scant not even a reference to best management practices or a sign off from a suitably qualified independent engineer report commissioned by the Council at the applicants expense. We submit detail now will not reduce flexibility.

We note rule 16.6 but nevertheless **recommend** that the introduction to this Policy 13.21.16 be changed so that it refers within the policy at the start ' *The appropriateness of marine farms within in the offshore [sic] CMU will be classified as discretionary activities and will be assessed*' The opening paragraph of this policy should also go on to say "*....and may be provided for, by way of example and not limitation, when they are located*"

Policy 13.21.6 Sub- Clause (g): causes us significant concern. A straightforward read suggests if a Finfish AMA was located say 55 metres from an ecologically significant area or a scallop area then that is fine. This ignores the high volumes of waste from these activities. Even a bivalve farm discharges large quantities of waste (shell drop, faeces etc.) material (250 – 400 tonnes per ha per annum) which in high current areas could be easily spread into such areas in its proximity - let alone a large heavily polluting finfish farm discharging thousands of tonnes of more liquid type waste!

Accordingly we **recommend** that the distinction be made to the introduction of this sub clause and wording added along the lines of “*In the case of an AMA for bivalve farming more than 100 metres and in the case of a Finfish AMA more than 1800 metres from....*”

We **recommend** deleting the word “*significantly*” in clause 9g) (ii) to better ensure compliance with the NZCPS and Part 2 of the RMA.

We note the use of the word “*Outside*” in sub clauses (a) to (g) is rather vague and underlines the need for such areas to have significant buffer zones given the large volumes of waste generated from a Finfish farm over a large footprint.

The unfortunate blurring of the difference between the use of AMA (incorporating a Finfish AMA) and the use of the separate term Finfish AMA causes the Association some nervousness in relation to Near-shore CMU’s and the mechanism by which a AMA (including Finfish AMA’s) might be facilitated into these highly sensitive areas. We **reserve** the right to submit further on this issue as the hearing process proceeds and /or we obtain expert professional advice.

16. Avian Issues

We note the proximity of the new FAMA’s to the important and endangered King Shag feeding and colony areas. We understand other submitters will provide more detail as to the likely significant adverse impacts. However for now the Association merely records its concerns and sees this as another reason why the two FAMA authorisations should not proceed.

Conclusion

The Association submits that, for a variety of reasons, these proposed FAMAs and the associated activities are in **inappropriate areas**. Accordingly, authorising these two FAMAs as is proposed by Variation 1 A is a breach of the objectives and policies of the New Zealand Coastal Policy Statement (NZCPS) and the purpose and principles of Part Two of the Resource Management Act (**RMA**).

To assist the Association has also made a number of recommendations to improve the proposed Policies and Rules set out in Variation1A, which it looks forward to discussing at the hearing.

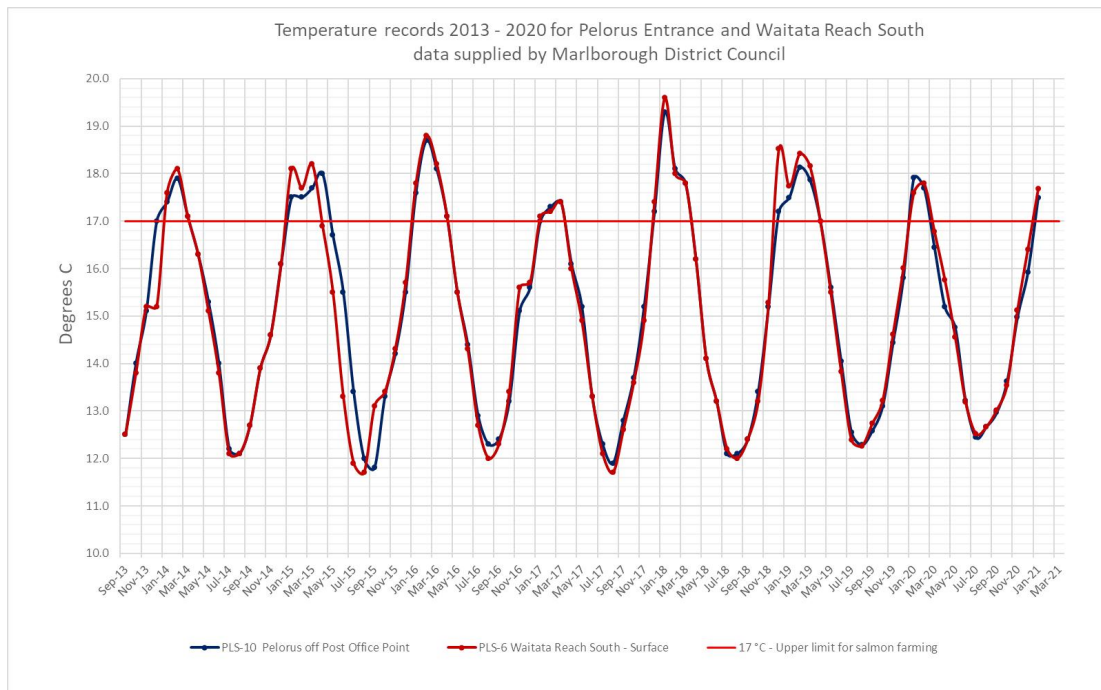
Yours Sincerely



Andrew Caddie
Kenepuru and Central Sounds Residents’ Association
President
Email: president@kcsra.org.nz

Schedule One

Temperature Time Graph Series for Pelorus Sound



Schedule Two

KCSRA Technical Paper – “Salmon Mortality in the Pelorus – Why?”

Salmon Farming: It's all about Location, Location, Location

The Kenepuru and Central Sounds Residents' Association (KCSRA) has been interested in different aspects of salmon farming in the Marlborough Sounds for some time. KCSRA's interest sharpened in 2012 as a result of New Zealand King Salmon (NZKS) wanting to place a large number of new salmon farms in the Sounds in areas then prohibited for marine farming. To achieve this NZKS initiated a Board of Inquiry process under the Resource Management Act (RMA). Coincidentally in 2012, a mass salmon mortality event happened at the NZKS Waihinu farm in the Pelorus.

Understandably, KCSRA was concerned at the reputational risk to the Sounds in terms of it being associated with large fish mortality events and this risk being enhanced as a result of the ramped up NZKS proposals. We were also nervous about the disease risk spilling over into other areas or other species.

Questioning NZKS experts as to their knowledge of this event at the Board of Inquiry proved largely fruitless. So, contemporaneously, KCSRA also sought answers as to the cause and extent of the mortality spike from the bio-security regulator – the Ministry for Primary Industries (MPI) via the Official Information Act (OIA). Answers to a number of our requests were declined by MPI. A complaint was made to the Ombudsman who initiated an inquiry. In due course (well over a year later) our complaint was largely upheld.

In 2015 another mass mortality event was reported by the media again at the NZKS Waihinu farm in the Pelorus. Again very little concrete information/analysis was supplied to the general public by MPI. Again the Association sent OIA requests to MPI, trying to find out what was going on, and if this was going to become the new norm. Again, “commercial sensitivity” was cited as a reason to withhold information.

Given this background and the interest shown by some members, KCSRA formed a small working group to carry out our own research and analysis to get an understanding of the root causes of NZKS salmon dying en masse in the Marlborough Sounds on a regular basis. The efforts of this group have led to this paper.

This paper collates data and evidence together from many sources, to explain to members and the general public what we have been able to garner about why, what and how these mortality events are happening and why in our view it is likely to continue to happen.

Introduction

Salmon Farming: Location, Location, Location

This slogan taken from the real estate business is also very apt for salmon farming.

In short, farming salmon (Chinook, also known as King, Salmon, in particular) is not easy being high maintenance and requiring very specific particular conditions in order to be able to be farmed efficiently.

To date, as far as we can ascertain, NZKS believes the prime location for salmon farming in New Zealand is the Marlborough Sounds. As noted, in 2012 NZKS initiated a very controversial bid to obtain, via a fast track Board of Inquiry (BOI) process, the water and sea bed space for nine new salmon farms in the Marlborough Sounds.

For the BOI process, NZKS presented a large number of documents, some dealing with the technical aspects of successfully farming Chinook or King Salmon.¹

The excerpt below is from NZKS's Mark Gillard's Site Selection and Consultation Document.²

"Key matters for consideration in selecting possible salmon farm sites

20. Based on my experience, there are two overarching critical matters to consider in determining whether it is feasible to farm salmon productively:

- a. The first critical matters are the key appraisals of the physical characteristic required for salmon to successfully grow (rather than perform poorly or possibly die). These are primarily:
 - i. Water temperature - salmon prefer cooler waters and usually grow best in water temperatures between approximately 12 to 17°C;
 - ii. Water depth - which preferably should be at least 30 metres and ideally 40 metres or more;
 - iii. High current - it is generally preferable to grow salmon in areas of high current.

Water depth and current can impact on temperature, but are also important in terms of "flushing" by-products from the farm area. It is not an exact science. For example, some warm sites that are at the marginal temperature of 17 °C (or even just over in the summer), can be managed if they are for example stocked at times to avoid warm temperatures especially with smolt during their first year in seawater. Our existing site at Waihinu Bay falls into this category. Although we have farmed this site for over 20 years, we do still experience difficulties with our autumn mortality event." ³

¹ Details of the Board of Inquiry, including written evidence and transcripts of the hearings, may be accessed at:

<http://www.epa.govt.nz/Resource-management/previous/king-salmon/Pages/default.aspx>

² <http://www.epa.govt.nz/Resource-management/previous/king-salmon/evidence/Pages/Corporate-and-consultation-evidence.aspx>

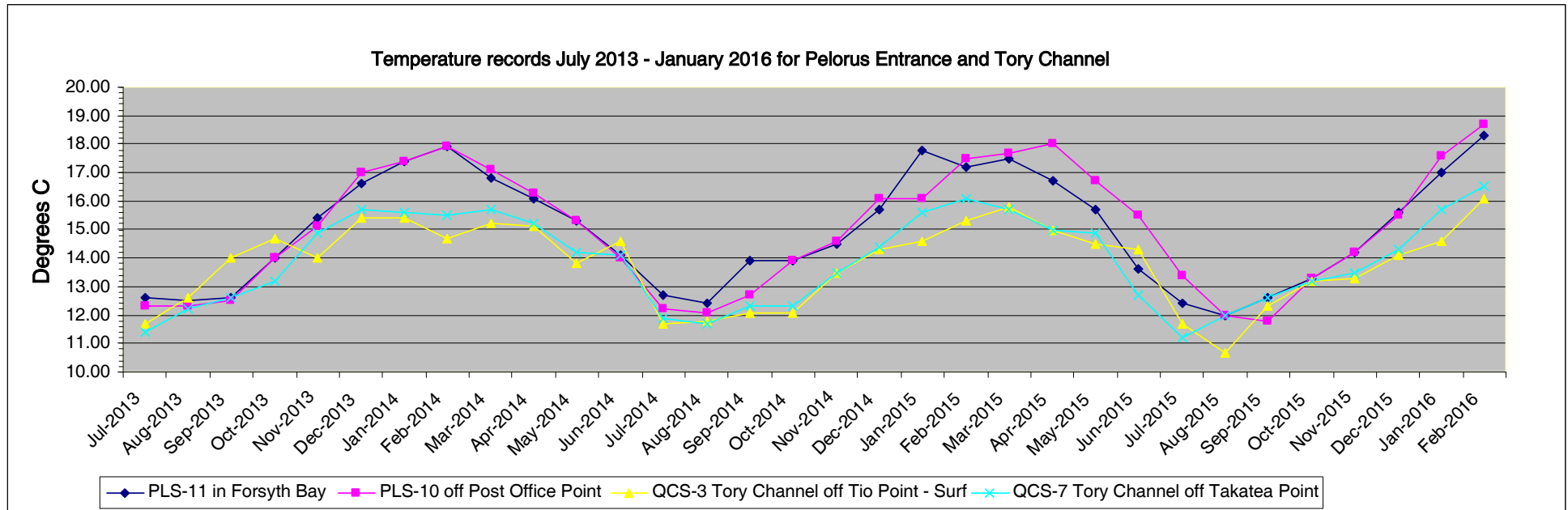
³ Emphasis added

Water Temperature

Clearly water temperature is a critical factor. So how does the Marlborough Sounds perform against this factor?

Figure 1 below shows recent temperature measurements collected by the Marlborough District Council (MDC).⁴

Figure 1 2014 and 2015 Average Monthly Temperatures in Outer Pelorus Sound and Tory Channel



The Pelorus is significantly warmer than Tory Channel and the average monthly temperatures in the summer are above the ideal temperature range of 12 – 17 °C for king salmon. In the Marlborough Sounds, Tory Channel, from a temperature point of view, provides the best growing conditions for salmon, exhibiting the correct water temperature, good depth and high current flow.

The question that remains to be answered is whether the environment of the Pelorus Sound is good enough to grow salmon successfully.

⁴ http://www.marlbrough.govt.nz/Environment/Coastal/Monitoring-Research/~/media/Files/MDC/Home/Environment/Coastal/MDC_Monthly_Monitoring_Locations_Marlborough.pdf

Salmon Environmental Requirements

There is more to what makes up the ideal mix of growing and living conditions for farmed Salmon. The web site “The Fish Site”⁵ provides fish farming guides for a long list of farmed fish species.

For salmon, seafarm locations are selected on the basis of season water temperature profile, dissolved oxygen content, salinity, depth and current velocity; exposure to storms; presence of harmful algae and diatoms; proximity to other farms; and in compliance with local regulations. What follows is a snapshot of the various salmon species requirements.

Chinook (King) Salmon farming (the species favored by NZKS) is < 1% of total salmon farming in the world, Unfortunately this means there is not much data available on the web about the specific requirements of Chinook. Coho Salmon come closest.

However, there seems little disagreement that Chinook Salmon grow best when temperatures are in the range of 12–17 °C, while water currents have to be sufficient to disperse wastes and provide a continuous supply of well-oxygenated water. Chinook (King) Salmon remain in seawater for 15–18 months and are harvested after reaching 3.5–4.0 kg.

Coho Salmon tolerate a wide array of oceanic conditions but grow best when temperatures are in the range of 9–15 °C, and water currents are sufficient to disperse wastes and provide a continuous supply of well-oxygenated water. Our research suggests that stocking densities at harvest should not exceed 8–12 kg/m³.

Coho Salmon remain in seawater for 10–12 months and are harvested after reaching 2.5–3.5 kg. Best management practices dictate that a seafarm should contain only a single year class of fish. This practice reduces the risk of disease transmission to arriving smolts.

Atlantic Salmon seem to grow best in sites where water temperature extremes are in the range 6–16 °C, and salinities are close to oceanic levels (33–34 per cent). Water flows need to be sufficient to eliminate waste and to supply well oxygenated water (approximately 8 ppm).

Maximum stocking densities of up to 20 kg/m³ are usual. Atlantic Salmon are ongrown in seasites for up to 2 years with harvesting of fish from 2 kg upward. Seasites normally contain a single generation of fish. It seems good practice is to fallow seasites for a period of 6 weeks or more prior to the introduction of a new generation of fish.

Salmon Health

Salmon Health and Water Temperature

Our research shows that: ⁶Because water temperature affects the health of individual fish, it also affects entire populations and species assemblages. Temperature may directly affect salmonids in

⁵ <http://www.thefishsite.com/> - news, features, articles and disease information for the fish industry.

⁶ www.nwfsc.noaa.gov/trt/wlc/viabrpt/appendix_l.pdf - APPENDIX L

MAXIMUM TEMPERATURE: UPPER OPTIMAL TEMPERATURE LIMITS FOR SALMONIDS IN THE WILLAMETTE AND LOWER COLUMBIA RIVERS

Ann Richter and Steven Kolmes

Environmental Studies Program, University of Portland

obvious ways, or indirectly through interaction with other important variables. (Dunham et al. 2001).

For example:

- Given sufficient magnitude and time, high temperatures can cause weight loss, disease, competitive displacement by species better adapted to the prevailing temperature, or death (Sullivan et al. 2000).
- When fish are stressed by any one process, they are less able to deal with other stressors. Salmonids already stressed by high water temperature will be less able to deal with a second stressor (e.g., **toxic pollutant, pathogen**). **Warmer temperatures often increase the infection rate or virulence of fish pathogens and lessen the ability of a fish to withstand disease** (Materna 2001) (Emphasis added).

Salmon Health and Water Flow

With salmon farming, high flow seems desirable, as it flushes away the excess nutrients (uneaten food pellets, fish faeces, etc.) from the farm and deposits it elsewhere. The seabed under a farm gets less quickly impacted than in low flow locations. Deeper water is also advantageous, as there is more time for the particles to be flushed away and the salmon are further removed from the ill effects of sulphide outgassing, low dissolved oxygen, etc. caused by a heavily impacted seabed. However we note that it seems that low flow sites can still be farmed effectively if best management practices are followed.

Salmon Health / Mortality and NZKS

So how do these factors play out in NZ in terms of mortality over the growing cycle? How does NZKS perform against its peers on a global basis?

Well, that sort of information is very hard to source from either NZKS or the Government agency responsible for monitoring disease outbreaks and animal health welfare – MPI, commercial sensitivity again. Nevertheless we hunted around the web and came up with some very interesting figures from an Industry group called the Global Salmon Initiative (GSI) of which NZKS seems proud to be a member.

From a Global Salmon Initiative Sustainability report⁷:

Fish mortality is a key measure used to evaluate fish health during production. We have chosen to measure mortality using a 12-month rolling mortality rate. This measure calculates mortality for the last 12 months (January – December) as a proportion of the estimated number of fish in the sea in the last month of the year (adjusted for harvest and mortalities).

From the GSI data we compiled Figure 2 below, which, as we understand it, shows the recorded mortality figures for all the salmon farms operated by GSI members worldwide.

⁷ <http://globalsalmoninitiative.org/sustainability-report/sustainability-indicators/>

Figure 2 Worldwide mortality figures for farmed salmon

Mortality Figures (% of total farmed fish averaged over a year) for different types of Salmon						
~ 70% of total farmed salmon http://www.globalsalmoninitiative.org/sustainability-report		2013	2013	2013	2014	2014
Country	Company	Atlantic Salmon	Chinook Salmon	Coho Salmon	Atlantic Salmon	Chinook Salmon
New Zealand	NZKS		13.61			16.32
Australia	Huon	6.38			7.71	
Chile	AquaChile	7.00		5.60	8.80	4.30
	Blumar	5.85			4.18	
	Camanchaca	4.70			3.10	
	Cermaq	8.98		6.55	9.73	6.55
	Los Fiordos	13.90		4.40	9.80	3.80
	Marine Harvest	3.33			2.15	
	Multiexport					
	Foods	9.55			3.48	2.97
	Ventisqueros	6.20		8.21	5.13	3.37
Scotland	Grieg Seafood	9.80			11.60	
	Marine Harvest	6.40			14.40	
Canada	Cermaq	5.56			7.06	
	Grieg Seafood	6.80			5.20	
	Marine Harvest	6.61			6.88	
Faroes	Bakkafrost	4.96			4.86	
	Marine Harvest	2.10			2.84	
Iceland	Fjardalax	4.40			13.40	
Ireland	Marine Harvest	38.56			18.15	
Norway	Cermaq	4.25			4.09	
	Grieg Seafood	9.00			10.90	
	Marine Harvest	4.72			4.76	
Average mortality per type		8.05	13.61	6.19	7.53	16.32
Average normal mortality (Excludes mortality > 10%)		6.36			6.20	

Discussion of Figure 2

As can be seen from the GSI data, the global figures show an average normal mortality rate of 6-6.5% per year. Mortality rates > 10% are seen to be, as we understand it, caused by an abnormal event, like disease or infestation or high water temperature or a combination of all three.

In respect of the unusual high mortalities shaded above in Figure 1 we uncovered the following incidence reports/commentary:

- 2013 Ireland Marine harvest mortality due to Amoebic Gill disease (AGD) and in 2014 due to abundance of jellyfish at exceptionally high seawater temp.
www.thefishsite.com/fishnews/category/13/salmon/vars/country/cl/.../45
- 10 December 2013 ... CHILE - An outbreak of Infectious Salmon Anaemia (ISA) has been detected on a fish farm in Chile. ... New Research Can Help Predict Fish Mortality in ISA

Outbreaks CHILE ... Anemia (ISA) has been detected by Chile's National Fishery and Aquaculture service (Sernapesca) on a Los Fiordos salmon.

<http://aquaculturedirectory.co.uk/the-health-status-impacts-chilean-salmon-firm-results/>

- October 9, 2015 - Aquaculture News, News-Europe: Sea temperature rise proves costly for Scottish fish farmer
Rising sea temperatures have been blamed for a huge increase in annual costs, including the loss of fish worth £7.75million, at salmon farms operated by Marine Harvest (Scotland). The firm, part of Norwegian fish farming giant Marine Harvest, said “fish health challenges” and treatment losses during 2014 were impacted by a slight increase in water temperature. The health issues related mainly to sea-lice, algae and amoebic gill disease – all of which can be exacerbated by the smallest changes in temperature and be ruinous for salmon production.
<http://aquaculturedirectory.co.uk/sea-temperature-rise-proves-costly-for-scottish-fish-farmer/>
- And for the NZKS high mortality percentages: No report, **nothing at all** on the web about the 2013 and 2014 NZKS salmon mortality rates, although it seems to be up to triple the world average.

Questions we are interested in include: What causes these high NZKS mortality rates? Is it high at every Sounds NZKS farm or are there “hot spots”, specific farms where it happens every year? Is the salmon mortality spread out through the year or is there a large peak during the summer for instance? Is this mortality linked to changes in the marine environment or to other management practices such as feed or excessive stocking rates?

To try and answer these questions we decided to focus on the information we could garner for the NZKS “hot spot” – their farm at Waihinu Bay in the Pelorus Sound.

Salmon Farming at Waihinu

We believe the NZKS Waihinu Bay salmon farm has been in operation since 1989.

Our research suggests that it is a low- to moderate-flow site, with mid-water average flows of 8.4 cm/sec, and maximum water velocities up to 33.7 cm/sec. Water depth at the farm site is on average 26 m, with the net pens extending from the surface to a depth of about 20 m.

As can be seen from the MDC data in *Figure 1 2014 and 2015 Average Monthly Temperatures in Outer Pelorus Sound and Tory Channel*, the Waihinu farm is operating at or above the desired water temperature limit (17°C) for King Salmon for several months of the year (Post Office Point is closest to Waihinu Bay).

As part of its resource consents, NZKS needs to supply annual reports to the MDC. Unfortunately, for various legacy reasons these reports focus only on what is happening to the seabed (benthic) and not on farming operations or mortality events. However, we searched around.

2014 Mortality Event

NZKS reported for 2014 in the Global Salmon Initiative report (see Figure 2 Worldwide mortality figures for farmed salmon) a 16.3% overall mortality rate, for its farmed salmon. Against an average salmon mortality of 6.2% across the industry, we believe this is a fair indication that a significant mortality event has happened that year.

Our hypothesis was that the mass mortality happened at the Waihinau farm and we have found data supporting our hypothesis. Moreover, we estimate that half of the fish in this farm died in 2014. In a Stuff interview in March 2015, Mr. Rosewarne of NZKS also mentions a high mortality rate at the Waihinau farm in 2014.⁸ Accordingly it seems possible that there was an unusual mortality event in 2014, but, as yet, we have been unable to have this independently confirmed.

2015 Mortality Event

It does not seem rocket science to arrive at the conclusion that the Waihinau Salmon Farm is at best poorly located and at worst a disaster waiting to happen year after year. On that note we now turn to the latest reported unusual mortality incident involving NZKS operations in the Marlborough Sounds.

The following is taken from an interview reported on Stuff on 13 March 2015, with NZKS CEO Mr. Rosewarne:

*“NZ King Salmon chief executive Grant Rosewarne said **warm sea temperatures**⁹ at the company's Waihinau Bay farm, in Pelorus Sound, had contributed to the deaths. Rosewarne would not say for commercial reasons how many salmon had died, or how many fish were at the farm, but said the mortality rate was a "multimillion-dollar problem to solve".*

Water temperatures at the Waihinau Bay farm had stayed above 18 degrees Celsius for three months, Rosewarne said. "I don't think we've ever had it quite as bad as this year."

The increased salmon death rate in the Pelorus Sounds started in mid-February, Rosewarne said.

*The Waihinau Bay farm is the only NZ King Salmon farm affected by higher than normal mortality rates. No "**primary pathogen**" was pinpointed during investigations into what was causing the fish deaths, and there was no risk to human health, Rosewarne said.*

Rosewarne said staff were unable to move the fish to another site because it would put further stress on them, and there were no suitable alternative sites for the fish.

Wanting to know more about the scale and seriousness and response to this unusual salmon mortality event in the Marlborough Sounds, KCSRA sent several OIA requests to MPI.

We wanted to know what (and when) they had found out about the 2015 mortality event.

It is interesting to compare what we asked and what MPI was prepared or able to divulge bearing in mind the latter's concerns about breaching commercial sensitivity. As our last Ombudsmen noted in the title of her final report, regrettably OIA requests are increasingly a “game of hide and seek”.

⁸ <https://www.google.com/url?q=http://www.stuff.co.nz/marlborough-express/news/67314620/Millions-lost-after-warm-seas-kill-salmon>

⁹ Emphasis added

The interview with Mr. Rosewarne is dated March 2015. The most informative MPI response to our OIA requests after a set of reasonably cordial exchanges was dated December 2015.

It is clear from Mr. Rosewarne's reported remarks that in March 2015 there was a significant and unusual mortality event in full swing in at least the NZKS Waihinau farm.

However, MPI confirmed that NZKS did not see fit to notify MPI until some time in May 2015.

We asked MPI to confirm the name or names of the NZKS farms involved. MPI declined citing various parts of section 9 of the OIA (prejudice the commercial position of the person (NZKS) disclosing the information and that the information was supplied under an obligation of confidentiality).

From what MPI was prepared to confirm and in subsequent discussions it seems MPI has ruled out feed as a primary causative agent. MPI believed water temperature alone not to be the primary cause either. They preferred to point to a range of possible causative factors.

MPI confirmed that they had collected past and present mortality data as well as temperature and other environmental data for analysis, but they did not share this data with us due to commercial sensitivity issues.

No "pathogens" were found by NZKS during their investigations, but the MPI Animal Health Laboratory (AHL), confirmed that *Tenacibaculum maritimum* and a *Rickettsia*-like organism were detected in salmon samples. Further investigations are being carried out to determine if these pathogens are present in other salmon farms and other areas of the Marlborough Sounds.

Retesting fish from the 2012 Mortality Event at the Waihinau farm showed, using new and more sophisticated techniques, that these pathogens were also present then.

These pathogens are not seen by MPI as a threat to human health or warm blooded animals.

MPI has issued movement restrictions to the farms where the pathogens were detected, to mitigate the further spread of the pathogens while investigating the cause of the mortalities. Of course they could only do that, once they became aware of the unusual mortality event.

For the full details of the questions and answers see the KCSRA web site www.kcsra.org.nz.

So What Next?

As far as we know the Waihinau farm was not restocked with smolt in 2015.

In May 2015, we understand that smolts (very young salmon) were introduced into the Forsyth farm. MDC records state that early January 2016, the Forsyth farm structure was towed with the young salmon to the new Waitata farm location.

This is the first time that the Waitata farm location has been used. It is near the Waihinau farm.

To date MDC records show that the Sound water temperatures in this El Niño year are even higher than in 2015. We will endeavour to find out what is happening at Waitata Bay. Given their close proximity we believe the Waihinau, Forsyth and Waitata farms could well share the same pathogens.

Conclusion

In our view from the evidence we have collected, it seems clear that the Waihinau farm mass mortality events are not isolated events, but happen frequently, and may do so as long as NZKS keeps farming salmon in the Pelorus Sound and certainly at this site.

A likely consequence of high seawater temperatures during summer, combined with low to medium current flows, is to stress the salmon to the point of dying en masse from heat stress. It is possible that associated salmon pathogens are now endemic in the Pelorus.

Will we be seeing another interview in Stuff with Mr. Rosewarne explaining about yet another mass mortality event? Is the Waitata farm location actually good enough to successfully grow salmon? We note that NZKS are claiming a “cracker” production year at Waitata so we will monitor to see if it is a sustainable result repeatable in the coming years. We will also continue to support efforts to have NZKS adopt best management practices as soon as possible. The Sounds deserves nothing less.

MPI needs to investigate if in 2014 an unusual mass mortality event occurred at Waihinau Salmon farm. If yes, why was it not reported to them? In this regard we have been encouraged by the willingness of MPI to engage meaningfully with us and KCSRA now has a representative on the MPI Salmon Biosecurity Liaison Group.

Nevertheless, MPI needs to take immediate measures to ensure the well being of all the salmon farmed by NZKS, as the yearly mortality figures seem much too high in some of their farms. KCSRA believes there is a real and unacceptable reputational risk for the Sounds from these mortality events. In terms of the disease pool risk, notwithstanding that there is more than one member in the class of Rickettsia organisms, we **were alarmed** to realize that diseased Scallop shell fish in Ketu Bay (just across the channel) have shown signs of a Rickettsia-organism affecting them, according to an MPI report¹⁰.

By way of a postscript and breaking news, we note the issue by MPI of a Controlled Area Notice (CAN) under the Biosecurity Act 1993, effective 20 April. The CAN puts in place movement controls and procedures over the Outer Pelorus and Queen Charlotte Sounds. The CAN applies to live or dead farmed Chinook (King) Salmon and associated plant and equipment used in the farming of such salmon. The purpose of the controls is to prevent the spread of a Rickettsia- like organism and minimize the damage caused to farmed Chinook (King) Salmon populations in New Zealand by such organisms.

KCSRA intends to continue its dialogue with MPI into the triggers behind the issue of this CAN.

¹⁰ http://kcsra.org.nz/documents/scallops/151124%20KCSRA%20-%20MPI%20Final%20Report%20on%20Scallop%20Health_diseases%20in%20NZ%20to%20mid%202015.pdf

Marine Sub-Committee
Kenepuru and Central Sounds Residents' Association

May 2016

Acknowledgement: KCSRA would like to acknowledge the dedication and hard work carried out by one of our members, Hanneke Kroon, who did much of the research and analysis required to pull this “Plain English” comment on a complex area together.

Schedule 3

Policy 13.22.10 – Managing adverse effects of finfish farms

The Association notes that there is not a similar policy in the MSRMP. This has resulted in an unfortunate patchwork of different environmental conditions set for the existing finfish farms in the Marlborough Sounds. These range from no environmental monitoring conditions (for example the Waihinu farm), to Best Management Practice guidelines environmental monitoring, to the very strict environmental monitoring conditions set by the Board of Inquiry (BOI) in the resource consents of the three salmon farms (Waitata, Kopau, Ngamahau) granted by the Board of Inquiry.

The BOI found in 2012 that a precautionary approach was required in the **absence of any knowledge** regarding the Waitata Reach ecosystem health, its capacity to assimilate the generated farm waste and the implications for the survival of the critically endangered King Shag. For these reasons, the BOI limited the number of new salmon farms from five to only two for the Waitata Reach and put a detailed and strict framework of consent conditions in place to manage the adverse effects of the farms it granted.

Use of Guidelines?: This lack of even a minimum standard for the environmental monitoring of the seabed and water column for the older finfish farms was addressed by MDC in 2013 and resulted in a monthly water quality monitoring program in the Marlborough Sounds and two living documents called the Best Management Practice Guidelines benthic²² and water column²³ (BPM) were also developed.

The intent of these BPM guidelines is that they become an integral part of the conditions of consent dealing with the adverse effects on the benthic and water column for every finfish farm in Marlborough.

The following excerpt is from the BMP benthic, page 2:

The primary purpose of this BMP is therefore to provide consistent and clear requirements for the management and the independently conducted annual benthic monitoring of existing farms. Central to this is a set of agreed EQS with accompanying transparent rationale for their selection and use. This document therefore provides details about what should be measured, where, and how often, and specifies consequences in the event of non-compliance. It is intended to be a living document that will be reviewed, updated and amended to accommodate evolution in knowledge and technologies.

To date however, NZKS has in, our view, been very reluctant to voluntarily adopt the BPM guidelines for their finfish farms, obviously preferring the old style, less demanding consent conditions.

With this proposed policy 13.22.10, we submit that NZKS gets their wish for some vague monitoring intentions, specified in sub clause (a)(i), (ii) and (iii), as well as an adaptive management regime based on low or unspecified thresholds and management responses in sub clause (a)(iv), (v) and (vi) instead of the comprehensive set of Best Management Practice Guidelines.

The Association cannot understand why this important body of work is not specifically incorporated into the Variation?

²² Best Management Practice guidelines for salmon farms in the Marlborough Sounds Part 1: Benthic Environmental Quality Standards and Monitoring Protocol (Version 1.1 January 2018)
New Zealand Aquatic Environment and Biodiversity Report No 219. – 54 pages.
<http://www.mpi.govt.nz/news-and-resources/publications> - search for AEBC 219

²³ Best management practice guidelines for salmon farms in the Marlborough sounds Part 2: Water quality standards and monitoring protocol (Version 1.0 October 2019).
New Zealand Aquatic Environment and Biodiversity Report No. 230. – 69 pages.
<http://www.mpi.govt.nz/news-and-resources/publications> - search for AEBC 230

The Association submits, that this policy appears to have been written to induly facilitate NZKS who struggle to adhere to the environmental consent conditions. Council is we submit failing to protect the receiving marine environment, its ecosystems and biodiversity from the significant adverse effects resulting from NZKS's salmon farms. It begs the question: Why should NZKS be allowed to pollute the marine environment to an even greater extent in the future?

Government Aquaculture Policy: In 2019 the Government announced *The New Zealand Government Aquaculture Strategy*²⁴. In its introduction, the Minister of Fisheries states:

My vision is that New Zealand is globally recognised as a world-leader in sustainable and innovative aquaculture management across the value chain.

Managing the adverse effects of finfish farming in the Marlborough Sounds as proposed in Policy 13.22.10 does not, we submit, reflect the Minister's vision of "*world-leading sustainable aquaculture management*".

What is missing in Policy 13.22.10 is, we submit, any reference to the official scientific BPM documents, any reference or description of the Environmental Quality Standards (EQS) and any details as to the other adverse effects that need to be managed via clause (b).

While reviewing the sub clauses (a)(i) to (a)(vi) it becomes apparent, we submit, that the Marlborough District Council has been busy re-inventing the wheel again. All this seemingly without any understanding of the science underpinning the monitoring and adaptive management regimes required to manage the adverse effects that the salmon faeces and uneaten feed pellets, have on the water column and the benthic of the surrounding marine environment.

Policy 13.22.10 is vague in the extreme, with the sole exception of sub clause (a)(iv), where new environmental limits for the seabed under and around the farm are defined in terms of Enrichment Scale numbers only. Sub clause (a)(iv) will be considered further below.

In short this Policy is we submit full of intentions but no substance and as such is basically flawed. However, some "substance" can be readily achieved by referring to the Best Management Practice guidelines for the benthic and water column as the guiding documents. Sub clauses (a)(i) to (a)(vi) should be replaced by a reference to the Best Management Practice guidelines for salmon farms in the Marlborough Sounds.

Section 32 report: The rationale given in the Section 32 Evaluation Report for Policy 13.22.10 in section 5.2.1, that this is a flexible policy towards the water column effects, where the Council can respond to the rapidly evolving base of scientific knowledge in this area, raises more questions than answers.

The BPM documents are designed to be living documents, with a review planned every five years. They are not cast in stone. A Benthic or Water quality Advisory Group discusses the changes and modifications needed for the benthic or water environmental quality standards and monitoring protocols. It is incomprehensible to the Association why the Council would not incorporate these Best Management Practice guidelines, now that they have been completed. We look forward to the Council's explanation.

Further Consideration of Policy 13.22.10 - sub clause - (a)(iv)

The thresholds in this sub clause are expressed solely in terms of an Enrichment Stage number.

²⁴ The New Zealand Government Aquaculture Strategy – ISBN978-1-99-000832-0 (print) 978-1-99-000833-7 (online).

These threshold levels for managing the adverse effects on the benthic do not correspond with the limits given in the BPM guideline documents, which balances the abstract Enrichment Scale number with a test of the corresponding visual observations of the seabed, or a soil chemistry measurement, such as the total free sulphide level or redox.

This unfortunate change by MDC was foreshadowed by NZKS in the Waitata hearing in held in November 2019. At the hearing NZKS attempted to artificially shrink the measured benthic footprint of the Waitata farm, which was 40% large than permitted after only three years of operation. At that time the change suggested by NZKS was to apply the BMP benthic boundary test for the Outer Limit of Effect (OLE), instead of the much stricter boundary test defined by the Board of Inquiry in Condition 40 of the consent.

Since then, the BMP boundary test must have been found to be still too restrictive. So MDC has now we submit (no doubt after further discussions with NZKS?) relaxed this boundary test even further and done away with using any of the individual Environmental Quality Standards parameters that underpin the Enrichment Stage scale.

The Enrichment Stage scale of 1 to 7 is a construct, created by combining 3 groups of Environmental Quality Standards parameters, where a weighted average is taken, which results in a single number between 1 and 7 on this Enrichment Stage scale.

It is a handy shorthand, but is too broad brush we submit to use on its own, without the additional test of checking if specific EQS parameter values are consistent with the calculated ES number. It is a way of making sure that the calculated ES number is consistent with the observed or measured level of benthic degradation.

To illustrate we use as An example the NZKS Te Pangu farm in Tory Channel, where the Best Management Practice guidelines apply.

The consent conditions specify the following Benthic Quality Standards (BQS) in conditions 33 to 35:

1. ES score below the net pens ≤ 5.0
2. No more than one replicate core in the ZME (i.e. below the net pens) shall be azoic (i.e. no taxa)
3. No obvious spontaneous out-gassing of hydrogen sulphide and methane in the ZME (i.e. below the net pens)
4. Beggiatoa bacteria coverage no greater than localised and patchy in the ZME (i.e. below the net pens)

Compare this environmentally sound and prudent approach approach with what is now proposed by sub clause (a)(iv) that states as threshold:

For benthic effects a maximum enrichment stage of 5 is the maximum adverse effect at or near the farm structures.

For the Te Pangu farm, the ES under the fish cages was calculated as less than 5, but there is spontaneous out-gassing and the Beggiatoa bacteria coverage is mat forming instead of the allowed localised and patchy appearance²⁵.

The BPM benthic measure is applied and the farm is in breach of this consent condition. **However**, applying the proposed Policy 13.22.10 - sub clause - (a)(iv), the Te Pangu farm is within the limit set and not in breach. Far too convenient and surely we submit in breach of Part 2 of the RMA.

²⁵ Dr Hilke Giles, Pisces Consulting. Comments on 2018-19 Annual Report for Te Pangu Bay farm - U150081. Page 5.

Waitata Example: The same comparison can be made for the threshold conditions set for the Outer Limit of Effects. **Our example** here is the Waitata farm in the Pelorus Sound, where the consent conditions have been set by the Board of Inquiry and are as shown below for the determination of the area of the benthic deposition caused by the salmon farm.

Condition 40 – Waitata Farm

40. *At all times, the seabed beneath and in the vicinity of the marine farm shall comply with the EQS specified in **Table 3**. Zone dimensions and area for compliance purposes shall be defined in accordance with Condition 39. Enrichment Stages (ES) shall be defined in accordance with Figure 4 and Table 5.*

Table 3: Environmental Quality Standards (EQS) - Seabed Deposition

Zone	Compliance Monitoring	EQS
Zones 1 & 2 - beside and beneath the net pen	Measured beneath the edge of the net pens - "Pen" Stations on Fig 3	ES ≤ 5.0 No more than one replicate core with no taxa (azoic), No obvious, spontaneous outgassing (H ₂ S/methane), No obvious, spontaneous outgassing Bacteria mat (Beggiatoa) coverage not greater than localized/patchy in distribution.
Zone	Compliance Monitoring	EQS
Zone 3 near to the net pens	Measured at the Zone 2/3 Boundary Stations on Figure 3	ES ≤ 4.0 Infauna abundance is not significantly higher than at corresponding "Pen" Station Number of taxa >75% of number at relevant / appropriate reference Station(s)
Zone 4 – outside the footprint area	Measured at the Zone 3/4 Boundary Stations on Figure 3	ES < 3.0 Conditions remain statistically comparable with relevant / appropriate reference Station(s)

The Outer Limit of Effects boundary is called the Zone 3/4 boundary in the table above.

The proposed threshold for the Outer Limit of Effects in sub clause (a)(iv) states:

For benthic effects a maximum enrichment stage of 3 is the maximum adverse effect at the outer limit of effects.

For the Waitata farm, the ES at the OLE boundary was calculated as less than 3, but Dr Giles in her report²⁶ then looked at the 2nd threshold and came to the following conclusion:

The 2018-19 Annual Report describes conditions at 600N and 600S as follows:

Although ES scores remain within the consented EQS for the OLE, both OLE stations had elevated total free sulphides compared to reference stations (Table 2 summarises all observations for the WTA sites). Macrofaunal abundance was slightly elevated at 600 N, while macrofauna

²⁶ Dr Hilke Giles, Pisces Consulting. Comments on 2018-19 Annual Report for Waitata Reach farm - U140294. Page 17.

abundance at 600 S doubled since last year and was c. 10- fold higher than reference and baseline values (Morrissey et al. 2015).

Macrofaunal community composition has always differed at 600 S compared to other stations (possibly due to the large particle size of sediments here), however it is likely farm deposition is causing a fertilisation effect at this site. This is supported by changes in sediment chemistry, which suggest an enrichment effect at both OLE stations.

I therefore interpret that, in order to assess this EQS requirement, all parameters describing chemical, organic and infauna characteristics of the seabed need to be considered.

Based on this interpretation and the results described in the 2018-19 Annual Report, I conclude that this EQS requirement is not met in either northern or southern direction.

Dr. Giles concludes that the threshold for the Outer Limit of Effects is not met and the farm is in breach of this part of condition 40. The benthic footprint of the farm exceeds the allowed footprint size.

However, when **applying the proposed Policy 13.22.10** - sub clause - (a)(iv), the Waitata farm is within the Enrichment Stage limit set for the OLE boundary and **not in breach** of consent conditions. Again somewhat convenient.

Why is the outcome different?

ES 3.0 corresponds to discernible ‘moderate enrichment’²⁷ and is a state that is unlikely to be found naturally. ‘Natural’ (i.e. non-farm impacted) seabed in the Marlborough Sounds varies from about ES 1.5 to 2.5 (but no greater than ES 2.9). By checking only for $ES \leq 3$ as the footprint boundary test, a significant part of the actual farm footprint **will be excluded**. In comparison, the BOI boundary test includes all of the farm footprint and the BMP boundary test includes most of the footprint.

We look forward to discussing these interesting concessions for NZKS at the hearing

²⁷ Keeley, N.; Forrest, B.; Crawford, C.; Macleod, C. (2012a). Exploiting salmon farm benthic enrichment gradients to evaluate the regional performance of biotic indices and environmental indicators. Ecological Indicators 23: 453–466.