SANFORD BIG GLORY BAY SAMON FARM RESOURCE CONSENT VARIATION

RESPONSE TO SECTION 92 REQUEST

INTRODUCTION

On 22 May 2018, Sanford received from Environment Southland a request for further information under section 92 of the Resource Management Act 1991 in relation to its application to vary the conditions of its existing salmon farm resource consents.

This document sets out Sanford's responses to that request. Also included are some responses to technical queries from NIWA's review report that accompanied the section 92 request but for which no reply was specifically requested.

QUESTIONS POSED BY ENVIRONMENT SOUTHLAND

The request comprised the following questions:

1. A final copy of the summary of the application which is to be used in conjunction with the application for public notification purposes. We think this will enable the public to understand the application in a general sense before using the application and further reports to base their submissions on.

2. An assessment of the effects of the level of deposition on oxygen depletion and fish health.

   The Technical Comment identified that this has not sufficiently been assessed in the application. The current documentation describes the levels of predicted total organic carbon, but does not assess what this means for the existing environment or what types of effects will manifest from these levels. See Technical Comment Section 3.2, paragraph 2 (attached).

3. An outline and assessment of the ecological and farming consequences of the impact on deposition by using the Enrichment Scale.

   The Technical Comment outlines that this is not addressed in the application, or further documentation. AES (2018) identified the expected Enrichment Scale (ES) score, as outlined in Figure 27 (AES 2018, Part 2). Within the boundaries of Farms 339 and 246, the ES is not below 5. Please identify the differences between farms in the Marlborough Sounds and in Big Glory Bay, and why it is appropriate for Big Glory Bay farms to exceed an Enrichment Scale score of 5, when farms in Marlborough Sounds are restricted to this enrichment score.

4. An assessment of the adverse effects on the environment with regard to the increased deposition and use of the binding agent.

   Please include an assessment of the level of risk and significance of effects of using the increased deposition and the use of the binding agent on the health of fish and fish densities at the site; on the receiving environment, and wider flora and fauna. See concerns relating to this in Section 3.2.1 of the Technical Comment.

5. Further explanation of the definition of “recovery”, specifically expanding on “to a state that the area can be farmed again”.

   Which parameters, levels, or concentrations of contaminants and nutrients are suitable to identify when a site is able to be farmed again? The additional reports are not clear on this matter and we need to know this so that we have a baseline to identify and compare adverse effects and monitoring.

6. A description of what the operational response will be if “recovery” takes longer than 5 years. There is concern that if the environment is degraded, it may take longer to recover when fallowed.

SANFORD’S RESPONSE

Sanford’s responses are set out below, noting that points 5 and 6 above are addressed collectively.

SUMMARY REPORT FOR NOTIFICATION

This document is attached.

OXYGEN DEPLETION AND FISH HEALTH

The predictions of dissolved oxygen apply to both the surface and seabed because the model is a 3D model (10 vertical layers) and therefore takes into account oxygen levels near the seabed. Model results indicate little change with water depth, although benthic oxygen respiration was not accounted for. However, given the flushing time of the Bay (less than a month) it is considered unlikely that there would be depletion of the lower water column.

Also, DO has been measured for several years through the entire water column and measurements to date in the bay indicate little differences between surface and near bed oxygen measurements (ADS 2016, 2017 yearly compliance reporting).

In terms of effects on fish health, Sanford operates its farms in a manner that produces high quality, healthy fish for human consumption. Doing so requires that the environment is of similarly high quality, and that includes maintaining dissolved oxygen at appropriate levels. It follows, as a matter of logic, that maintaining dissolved oxygen at levels that are suitable for farming fish will also ensure that dissolved oxygen levels in the wider environment are suitable to sustain fish and other marine species.

We also note that the proposed variation includes the requirement for average dissolved oxygen levels in Big Glory Bay to be maintained above 7 mg/L at the surface.

Notwithstanding the above we agree with NIWA that

- Dissolved oxygen should be measured through the entire water column using suitable equipment with an optical probe; and
- That an average dissolved oxygen concentration of 7 mg/L be maintained throughout the water column.

USE OF THE “ENRICHMENT SCALE”

Sanford has not utilised the Enrichment Scale because it was not considered to be appropriate to the way that Sanford manages its farms, or necessary in the Stewart Island geographic location.

It is important for context to appreciate that the level of deposition will be similar to that which occurs currently.

Reasons for this include:

i. The stocking density within the individual cages will not increase.

ii. The increase in fish numbers will be accommodated in additional cages (thus spreading the deposition across an increased area within the already consented farms, but at a similar density as is currently occurring.

iii. Feed rates (weight of feed per unit of biomass) per meter squared are unlikely to increase. FCR is likely to decrease as improvements are made in feed technology over time.

As such, it is anticipated that the observations/measurements that are currently undertaken in and around the farm sites every year (as part of the existing compliance monitoring regime) will reflect what will be observed immediately beneath farm sites in the future.

We accept that the Enrichment Scale has been used in Marlborough at the NZ King Salmon farms. However the way those farms are managed is different from the way that Sanford manages its Big Glory Bay farms and from what is proposed in the future.

In contrast with the situation in the Marlborough Sounds, individual areas in Big Glory Bay will not be farmed continuously. In Sanford's typical seven year fallowing cycle (involving two years of farming and 5 years of rest) individual areas will continue be rested before restocking will occur. In recognition of this, the existing consent conditions focus on confining sediment deposition to within the consented areas and ensuring that there is little or no impact away from the consented areas and at control sites within Big Glory Bay.

We also note that the ES index has not been applied in any other areas of New Zealand (other than Marlborough) as it requires development in each new area to access background states and what would be meaningful change. We consider it more appropriate to focus on the key variable of interest such as organic and total waste deposition, noting that we also measure a number of other variables.

For all of these reasons we do not support any change to the existing regime.

INCREASED DEPOSITION AND USE OF A BINDING AGENT

As noted above, the level of deposition in the future will be similar to that which occurs currently. As such, the observations/measurements taken in and around the farm sites every year (as part of the compliance monitoring) reflect what will be observed beneath farm sites in the future. In short the "ecological and farming consequences" will not change, noting also that the area under the salmon farms represents < 0.3% of the entire Big Glory Bay water space and that no more than 21% of the consented area will be farmed at any one time.

The binding agent has been proposed to avoid the dispersion of excess feed and faeces into the wider environment, and instead confines its areal extent to under the farmed sites.

"RECOVERY"

The existing consents already provide for fallowing, and no changes are proposed in that regard, other than that there will be an explicit management plan put in place that will document specific procedures that have been informed by the results of ongoing monitoring.

It also needs to be stressed that "recovery" is intended to "rest" the farmed areas, in much the same way as occurs with pastoral farming. It is not the intention for the seabed to return to "natural", pre-farm state during fallowing.

We also stress that as the density of fish in individual cages won't change, the level of deposition at any specific location is most unlikely to change.

It also needs to be appreciated that the combination of the monitoring programme, farm management plan and the reporting programme, plus the use of review conditions mean that any unforeseen or unanticipated effects will be able to be acted on without delay. The proposed review condition also provides a "back stop" to enable Environment Southland to intervene if it is not satisfied with any aspect of consent implementation.

ADDITIONAL MATTERS RAISED BY NIWA

Although not part of the formal section 92 request, we set out below a response to several additional matters raised in the NIWA review.

For ease of reading, we first present each individual comment/question from NIWA in ***bold italics*** and then proceed to answer it.

Modelling

"That is not to say there are not perhaps better models available that include more parameters than a total ammonium approach. Dr Hartstein, one of the authors of the ADS reports, has previously developed a full NPZD (nutrient-phytoplankton-zooplankton-detritus) model for Big Glory Bay, which may have provided a more comprehensive assessment, and we wonder why that was not used in the present assessment. We do believe, however, that the DELFT3D model probably provides a "worse case" scenario in terms of Chl a enhancement."

The approach taken was adopted in order to present a "worse case" approach - similar to what was undertaken for the New Zealand King Salmon application.

Water Quality

"The modelling suggests that the additional nitrogen being applied for overall farms will increase that level to around 6 mg/m3, or an increase of around 4 mg/m3, a 2-4 fold increase relative to the present. This is predicted not to cause a significant decrease in water quality, and Sanford have offered a condition that keeps the average bay-wide additional surface Chl a levels to < 4 mg/m3. A 2-4 fold increase is a significant increase.

The model results indicate an increase in chlorophyll-a varying between 2 and 4 µg L-1 and not a constant 4 µg L-1 as stated in the above comment. Also, the modelled figures are an over estimation (especially during spring and summer) as mussels grown in the bay will reduce chlorophyll-a levels as they consume phytoplankton.

The modelled results are supported by the analysis of past chlorophyll-a data, outside natural variability. This shows that while there has been an increase in farming in Big Glory Bay there is no data to suggest that this has led to an increase in chlorophyll-a. In fact, some of the highest measurements (8 µg L-1) where recorded during the 1980's (**Pridmore and Rutherford, 1992**), despite significantly lower farming outputs at that time. This "one-off" chlorophyll-a spike was attributed to offshore nutrient upwelling.

Additionally, further reinforcing the conservative nature of the modelling is the fact that the model results do not take into account of nitrogen that will be removed during the harvesting of mussels and salmon or N that isn't up-taken due to other constraints on phytoplankton growth.

Finally, by way of context, site averaged monthly chlorophyll-*a* (a proxy for phytoplankton biomass) in Big Glory Bay in 2015-17 ranged from 0.3 to 3.1 µg/L. (James et al. 2018) with most measurements < 2 ug/L. Modelling predictions are that the average chlorophyll-*a* concentrations could theoretically increase to between 4 and 6 µg/L . It should be noted that these predictions exclude removal by mussels and ultimately removal of N through harvesting. The monitoring programme will ensure that if there was an increased risk of blooms this will be identified and adaptively managed.

"Further thought needs to be given to the spatial and temporal frequency of sampling to monitor that condition, how many replicates are required, and what is the response if some of those replicates exceed the limit. The conditions also refer to the limits as "at the surface". This is ambiguous, and should follow what is normally considered best practice and refer to an integrated sample taken over the top 5 m of the water column."

We agree that taking an integrated sample is logical, rather than relying on surface sampling.

Our specific suggestions in this regard are as follows:

1) Sampling should be also conducted regularly outside of the bay and if possible at the entrance to Paterson inlet. This is important in determining the extent to which changes in nutrient concentration/algae biomass are associated with external factors such as up welling from deeper water well outside of Big Glory Bay.

2) Standard integrated sampling of surface waters down to 5m is also suggested.

These details will be included in the EMMP and when management response is required in terms of across all sites and individual sites.

Thank you,

Alison Undorf-Lay

Sanford