



Review of the Assessment of Environmental Effects and technical information relating to a resource consent application for three new marine farms in Big Glory Bay

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Summary

The three marine farm applications are in offshore, deep locations in a sheltered semi enclosed bay with other shellfish and salmon farms.

Data collected and presented in the NIWA study describe the biological communities within each site and the authors raise no issues that they say would preclude these sites from consideration for marine farming activities.

The present assessment by Davidson Environmental Ltd. outlines several aspects where improvements could be made to the AEE and NIWA report. These suggestions are aimed at assisting decision makers.

These improvements could be done as a desk-top exercise. Improvements fall into two main topics.

1. Hydrodynamics and productivity. It is suggested that a NIWA water column expert provide additional comment on particular aspects (waves, water flow, and productivity).
2. Epibenthic communities. It is suggested that a NIWA benthic expert provide additional comment on epibenthic communities at these sites and how they compare to other areas in Big Glory Bay and Paterson Inlet.

Brief comments on monitoring conclude the assessment.

1.0 Introduction

Zane Smith & Tim Maass-Barrett submitted an application to Environment Southland to establish three marine farms in Big Glory Bay, Stewart Island. Sites 2 and 3 have been previously consented to Tim Maass-Barrett (April 1997), but these sites did not get Fisheries Permits and subsequently lapsed? Site 1 was identified as a potential marine farm site but has not been previously applied for due to the circumstances surrounding sites 2 and 3.

2.0 Job brief

Environment Southland asked Davidson Environmental Limited to review the water and benthic aspects of the AEE submitted with the application.

3.0 Scope of the assessment

The assessment by Davidson Environmental is limited to information presented in the Assessment of Environmental Effects (AEE). For the purposes of the present assessment the AEE has been split into two parts: (1) information provided by the resource management planner, and (2) technical information provided by NIWA.

The aim of the assessment was to provide positive comment on the document and identify aspects that require further work or clarification. Comments in this assessment are therefore aimed to ultimately at assisting Council and the Hearings Panel during its decision-making role.

4.0 Assessment

4.1 Resource Management planner

The AEE provides an outline of the proposed application, background, species, activities to be consented including structures and farming devices, site details, requested term, description of receiving environment, landscape, water quality, environmental effects, ecological carrying capacity, interactions with marine mammals, noise, safety and navigation, high value areas, heritage, and amenity values. The AEE also discusses positive effects should the applications be approved regarding nutrients and the local economy.

Assessment

Page 9 (para 1) the AEE states “In Big Glory Bay, no monitoring has detected any wider bay impacts that extend significantly beyond the boundaries of each site, including the finfish sites.”

Comment: this statement should be backed up with a reference from the relevant monitoring studies and inclusion of relevant extracts that support this statement. Apart from acknowledging fish and shellfish impacts are different, this section should be restricted to shellfish impacts.

Page 9 (para 2) – It is suggested in the AEE that the MAF model that was used as grounds not to Permit Sites 2 and 3 has been disputed and has been shown to be flawed. Note: a recent document investigating nitrogen budgets has been produced by Sanford.

Comment: Statements of this type need to be backed up by references and inclusion of relevant statements and/or conclusions from their source or sources. If the Sanford document is publicly available, it is suggested that this be included in the assessment.

Page 9 (para 3). The AEE states in Paragraph 2 “but research since that time has also shown that some of the assumptions used in the nitrogen model were flawed. However, an updated model is not available.” The AEE goes on to state in para 3 “Notwithstanding the lack of a working model, the assessment is that there is sufficient carrying capacity in the bay for the additional mussel farms. This assessment is based on the lack of any detectable impact from the existing farming on either the ecology of the bay away from the farm sites, or on mussel production on those existing sites”

Comment: the AEE draws conclusions from a source report or document/s that shows there is, in fact, additional carrying capacity in the Bay. This is an important issue. It is therefore important that the source and reasons for the planner’s conclusions be included and discussed in more detail in the AEE. At present the AEE statements are not well supported by the literature.

Overall, the assessment of water hydrodynamics and productivity issues requires inclusion of more data and statements from existing reports collected from Big Glory Bay to back up statements made in the AEE.

Page 11 (Para 1)

Comment: A brief summary of existing shellfish farm monitoring to date in Big Glory Bay would assist the reader but is not vital. A summary table outlining what has been conducted and where and the overall finding e.g. no impact outside consent boundaries, low levels of nutrient enrichment under farms?

Page 11 (Para 5) The AEE mentions water column issues such as nutrients, inhibition of water flow and wave attenuation (sentence 1). Other water quality impacts have also been mentioned previously e.g. dissolved oxygen.

Comment: The AEE raises several water quality issues but relies heavily on statements made in the 2009 Cawthron report to address these issues in Big Glory

Bay. The Cawthron report discusses impacts in a generic sense using examples of studies from around New Zealand. In addition, and where possible, the AEE should provide more data or assessment information from work conducted in Big Glory Bay and apply this to the application sites. If this is not possible it is suggested NIWA ask a water column expert to provide comments.

For example:

- **findings such as wave energy at these sites is unlikely (or likely) to be important based on fetch length and oceanic exposure;**
- **Studies have found that water friction through a farm may result in 5 to 60% reduction in flows (Hartstein 2003, Plew *et al.*, 2005 and Stevens *et al.*, 2008). Based on the size and scale of these sites they are likely (or not) to influence the farms immediately adjacent (downstream) or not.**
- **Consumption of phytoplankton at these sites are unlikely (or likely) to influence the farms themselves but return (or not) back to background levels soon after water leaves the sites.**

Page 12 (para 4). “Residence time can be from 5 to 14 days, and the water movement is the most significant towards the mouth of the bay close to Paterson Inlet.”

Comment: reference needed here.

Page 12 (last paragraph).

Comment: Do farmers adhere to the Industry Code of Environmental Conduct? If they do, it is suggested that this is stated.

Page 13 (Benthic Effects).

Comment: This section discusses monitoring and benthic conditions relating to the proposed site. This is based on the NIWA report. A brief overview of the potential benthic impacts at the beginning of this section would assist the reader.

Page 13 (Paragraph 2).

Comment: “the benthic environment under the existing farms is affected not affect”

Page 13 (Para 3). Copper concentrations are discussed beneath farm leases 338 and 339.

Comment: Copper is relevant to sites historically used for salmon farming. One of the present application sites was used to store fish cages. A comment on whether this is relevant to the present application would assist. Clarification on why copper is not an issue for shellfish farms would also help the reader.

Much of this section is not relevant to shellfish farming and instead associated with the impact of salmon farming. We suggest the impact of salmon farming be kept separate and used only to compare the level of impact between shellfish and fish. This would avoid confusion over the impact that would be expected at the application sites.

A description of the general impact of shellfish farms may assist the reader (references required).

Page 15 (wildlife)

Comment: There exists considerable literature on the interaction of marine farms and marine mammals in NZ and internationally (see reference list below for examples). Issues largely fall into (1) entanglement and (2) displacement. Discussion of the findings from these studies in relation to shellfish farms would assist the reader to determine if the present proposals are a concern.

Page 17 (Para 5) state “Indigenous fauna are present but no specific habitat areas, such as breeding grounds, are impacted by the existing or proposed sites.”

Comment: reference the report that shows no habitats of importance are present.

4.2 NIWA report

The NIWA survey of the three application sites sampled sediment (grain size, particulate organic carbon, depth of oxygenated layer, redox depth), as well as infaunal and epifaunal invertebrates (species presence absence, abundance). The authors state “The sampling design for this assessment was agreed upon between NIWA and ES in May 2017; sampling design was based on the bay-wide compliance environmental monitoring programme for marine farming established in 2012 (ES consent # 2072561).

At each application site NIWA collected: four benthic drop camera photographs (although only 3 for each site are presented in Appendix E) and two grab samples (2 sediment replicates from each grab, 1 infaunal replicate per grab, 3 D.O. per grab). No sonar or video work was conducted. Data collected from the application sites were compared with control (reference sites) established in previous studies Stenton-Dozey *et al.* (2012) and Stenton-Dozey and Cairney (2013). These latter studies were not produced in the AEE, but some data (e.g. photographs), are included in the AEE.

Comments:

All three sites are in relatively deep offshore positions. It is therefore unlikely rocky habitat is located within the three applications. It is suggested the authors comment to reassure the reader these sites are dominated by soft bottom substrata. This is important as no sonar or video sled tows of the seabed were collected to confirm the entire area of the applications was composed of soft substratum.

Descriptions of species present from within and on top of the sediment are provided for each application. It is suggested that comment is provided on their representativeness for (1) the application sites and (2) the wider Big Glory Bay. Questions such as: (A) are these application sites likely to be characterised by the soft-sediment dwelling communities found at the sample stations or could other substrates or species possibly be present? (B) are these habitats representative of the wider bay, inner bay or outer bay. There have been a number of studies describing the wider Paterson Inlet subtidal environment. These studies would be useful when placing the applications sites into perspective (e.g. Richardson 1981b, Willan 1981, Grange and McKnight 1987, Costello and Hare 1991, Department of Conservation 1991, Hare 1992, Elliot 1995a, 1995b, Davidson 2002). It is suggested these studies are utilized and those aspects are made clearer in the NIWA report.

The number of replicates used to survey the benthos in the proposed sites were low and there is a possibility epibenthic features present within each site have been missed. However, based on each application sites offshore position, depth and data available from other studies, it is possible the NIWA description applies to the total area of the application sites. It is suggested, however, that NIWA provide some discussion and draw on other studies to justify the accuracy of their study considering their low number of epibenthic samples and lack of data from wider ranging sample techniques such as video sleds or more drop camera stations.

It is unclear where sample stations were located within each application site. A Figure showing the sample stations would assist the reader.

Based on NIWA and other data presented in the present report, there appears to be a biological pattern from inner to outer Big Glory Bay. This trend appears to influence grain size as well as surface and within sediment dwelling invertebrates? An overview of bay-wide patterns based on a variety of reports and data would be helpful. Questions such as: are the application sites like inner low diversity epifaunal sites or more like higher diversity epifaunal sites in the outer bay?

Of note is the presence of *Neothyris lenticularis* (giant lampshell). This species is negatively impacted by mussel farming activities (Davidson and Richards, 2014). This species is however, widespread over many areas in Paterson Inlet (Richardson 1981; Davidson, 2002). Some discussion about the relevance of adversely impacting this species should the farms be approved is suggested (i.e. how does their decline in abundance under the farms relate to the bigger picture of Big Glory Bay and Paterson Inlet). Would the loss be regarded as significant to this species in the Inlet or are they so common and widespread it would represent a small or minor loss?

It would be helpful to know how far the *Galeolaria* tubeworm beds in Big Glory Bay are from the application sites. A brief comment on whether these farms if approved would impact that tubeworm feature would be helpful.

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Appendix 1. Details of the assessment author.

Education

My full name is Robert James Davidson. I am a marine biologist and hold the qualification of Master of Science in Zoology (First Class Hons) obtained from Canterbury University (1986). I have worked for the Ministry of Fisheries (1986-87), and Department of Conservation (1987-95). During my time at DOC, I was based at Nelson and employed as the coordinator of marine biological surveys throughout the Nelson Marlborough Conservancy. I was the principal author of several large-scale ecological reports and biological resource documents for marine areas in the DOC Nelson-Marlborough Conservancy. While at DOC I also coordinated resource inventory reports used by the Marlborough District Council, Nelson City Council, Tasman District Council and Canterbury Regional Council, outlining ecologically important marine areas for inclusion in their respective coastal plans (Davidson et al. 1993; 1995).

Private consultancy and experience

In 1995, I left the Department and established my own practice, “Davidson Environmental Limited”, which specializes in ecological research, survey and monitoring. To date I have produced 840 reports most of which have been associated with Resource Consent applications. Most of these RMA related reports have been for marine farm applications, farm impact assessments, farm revalidations and renewals and also marine farm monitoring.

I have also coordinated up to 27 consecutive years of monitoring for each of three Marine Reserves in the top of the South Island. Another long-term monitoring programme was the impact monitoring of ferries travelling through the Marlborough Sounds including Tory Channel (1995-2015). Recently I have coordinated a three-year programme updating and reassessing the biological value of sites in the Marlborough Sounds (Davidson et al. 2011). This programme has been extended with sites being revisited and new data collected to confirm their location and biological values (Davidson and Richards, 2015).

I have also been involved in several reviews and advisory roles including the Ecological Advisory Group for reviewing monitoring of the Tasman Bay Marine Farm Ring Road development, as a member of the MDC marine focus group, Top of the South Biosecurity Partnership, MAF Undaria Expert Advisory Group, and Mapua FCC contaminant clean-up programme.

I am the author or co-author of 18 conference papers in New Zealand and overseas. I have published 12 papers in internationally peer reviewed scientific journals including papers on marine reserves, subtidal soft bottom and reef communities.

Based on a wide range of long term studies combined with over 4000 working dives in the Marlborough Sounds, I have a very good understanding of subtidal environment of the Marlborough Sounds.

Summary of experience

- Working in Marlborough Sounds: 1988-2018 (30 years)

- Working dives: >4000
- Long term monitoring programmes: 26 years
- Resource Consent reports: 840
- Published papers: 12
- Conference presentations: 19
- Boating: SRL skippers ticket, 28 years navigating in the Marlborough Sounds
- Conflict of interest declarations

I am part owner of several marine farm consent areas in the Marlborough Sounds. I am also part owner in three research based marine farm sites located at Treble Tree Point, Waitata Reach, Pelorus Sound. Apart from the research sites, water space is leased out or is managed by a variety of marine farming companies including Aroma on contract. I have no shareholding or other beneficial interest in the present marine farm application.

I conduct contract work for a variety of organisations some of whom regularly submit or are involved with the process of marine farm applications (e.g. DOC, MDC, MFE, MPI, Marine Farming Association). I contract to the Marlborough District Council where I manage an ecological database and coordinate two ongoing monitoring studies (i.e. marine farm recovery study in East Bay and a ferry impact study in Queen Charlotte Sound and Tory Channel).

I take care to ensure that my business interest in marine farms and my role as a consultant for a variety of clients does not influence my role as an independent consultant. My relationship with clients and standing as an expert witness has been based on my responsibilities as a scientist, my expertise and my experience. My evidence today is therefore consistent with the best principles of scientific inquiry and any opinions and conclusions are based on my experience and understanding of biological theory, integrated with data collected during field work at and near the application sites.