SOUTHLAND REGIONAL COUNCIL HEARING 16 – 09 – 2019

SMITH-BARRETT APPLICATION

Appln. 20181316 Evidence from Jim Maass-Barrett

OVERVIEW The application is to set up three new marine farm sites in Big Glory Bay, Stewart Island, for the purpose of farming shellfish, mainly greenshell mussels.

Big Glory Bay (BGB) is a fairly enclosed bay on the south side of Paterson Inlet, approx. 12 km^2 in area and averaging about 20m deep. Water depth at the proposed sites is about 26m deep and BGB is the only possible area within reasonable reach of Halfmoon Bay/Golden Bay where marine farming is allowed. Much of BGB toward the head of the bay is relatively shallow, less than 10m, and covered in many places with beds of a red seaweed, Lenormandia. This area may be more suited to seaweed farming but shellfish are better suited to deeper water and less diverse seabed, such as the sites applied for.

In our opinion aquaculture, is the most efficient way of producing protein for a growing world and it is far too valuable to our country's and region's economic resilience to not maximise it where sustainably possible. Sadly, Southland, up to this time has been constrained in its development of aquaculture areas to basically BGB on Stewart Island, even though our cooler waters are the envy of the rest of the country.

In our application, we state that two of the three sites applied for have previously been granted Resource Consent by Environment Southland (ES) in April 1997, for Jim and Hilli Maass-Barrett, to farm mussels. MFish, as it was then known, declined to permit us to farm on those sites, and the consents eventually lapsed.

In those days a Nitrogen budget model had been worked out for the BGB ecosystem by a NIWA scientist, Dr Rick Pridmore, primarily to determine a safe level of salmon production from the bay. At that time, mussels were thought to be a net contributor to N levels in the water by release of N from the "waste patches" found under the farms.

This has since been demonstrated to be incorrect, as reported in Cawthron Report 1285 "Review of Ecological Effects of Finfish Farming". It gives a reference from McKenzie quoting a negative 1.4% contribution from mussels to the total N budget of the Marlborough Sounds, akin to a 0.28 -0.42 T/ Ha/yr total N **removal** at mussel harvest, based on production of 20 – 30 T/Ha/yr mussels. This compares to the above model predicting a 0.52 T/Ha/yr **contribution** of Nitrogen.

And from the Water Column review, "Accordingly, shell fish farms cause a net loss of Nitrogen." (Cawthron Report, Emma Newcombe, Pg 2).

There were some other assumptions that were untested and all worked towards lowering the theoretical number of hectares of mussels that could be farmed in BGB. The productivity of the bay was said to be in the order of 100 tonne of mussels per hectare per year, which is now seen to be extremely high as some sites would struggle today to produce 30 t/ha/yr. The model was based on the existing 15.5 farms producing between 4,900 and 6,200 T maximum per year with a probable yield of 3,500- 4,000 T.

To achieve these figures, it was necessary for every backbone on every site to have been harvested each year, so the whole cycle would have to take place inside 12 months, which is physically impossible. It's actually more of a 3 year or 3 year plus cycle in BGB.

MFish also attributed N input from both mussels and salmon simultaneously where a site had variations for both species, clearly not physically possible either as only one or other species could be farmed at any time.

These reasons are why MFish felt unable to issue the Marine Farming permit for those two sites while ES was happy to grant Resource Consents. The ministry's different interpretation was considered to be based on assumptions that were not correct.

Circumstances have changed dramatically since then as we will explain, which lets us conclude our 3 new sites should be granted consents.

BENTHIC SURVEY This is partly necessary to determine if the proposed sites are over areas of special features or communities. The survey was carried out by a NIWA scientist and the results were analysed and the report written by another NIWA scientist, Dr Jeanie Stenton-Dozey, who has first hand knowledge of, and a long association with BGB and its seabed.

The findings were much as we expected, relatively low diversity and moderate abundance overall, with Sites 2 and 3 reflecting the conditions found at the monitoring site, Control Site Head (more in the middle of the bay), and Site 1, which more resembled Control Site Mouth (nearer the mouth of the bay). These are the two control sites that the bay wide monitoring programme now use for reference stations for its monitoring of other mussel and salmon sites.

In terms of the species richness index used to describe biodiversity in these situations, on a sliding scale of 1 – 12 of increasing biodiversity, Site 3 had the highest score of 4.7 and Control Mouth lowest at 2.2.

J S-D states, "*This range is constrained considering the overall scoring range is 1 – 12*".

One interesting feature that showed up in the survey was the relatively high number of amphipods that were counted in 2 samples from Site 1 (NIWA Benthic Survey, Fig 4.6 Pg 20 and Fig 4.7 Pg 22). One core, 1A, had 106 and 1B had 53, much higher than any others.

We think this spike in numbers is a direct result of the removal of all oysters and many hundreds of tonnes of mussel crop from the MF sites immediately adjacent to the sampling site in the preceding weeks. These amphipods are very mobile and would have sought shelter in and on the seabed as their habitat disappeared around them.

As a side note, I have dived extensively to the seabed under Sites 2 and 3 when I surveyed transects for our original application in January/February 1996, and found no special or distinguishing features. In the next 3 or 4 years, I dived all over and around Site 365, connecting up 1 ton mooring blocks and steel anchors, 50 blocks and 50 anchors in total. I also dived under and outside of Li 474 and Li 366, and to the east of MF 274, searching for and retrieving lost mooring blocks, lifting lines and other lost objects. These dives took me close to our application Site 1 and in all this time I observed only flat featureless mud/sand bottom.

We are sure the drop camera images, taken during the benthic survey that show there is little of physical or biological interest at the application sites, are truly indicative of what is, or is not really present.

DESCRIPTION OF MARINE FARMING PROPOSAL The lines and anchors are generally set up parallel to the prevailing wind and current.

Mussel spat is sourced from 90 Mile beach near Kaitaia, which is the only approved site for spat collection for Stewart Island. Spat are normally harvested in spring and seeded onto mussel rope on the farm. They grow for a few months and when large enough to handle, maybe the size of pumpkin seeds, are thinned down from 3000 to 4000/m of line to about 500 – 800/m. If this is not done, a lot of the mussels can become lost by 'shedding' as they become overcrowded where upon they are eaten by spotties, starfish and other predators, or smothered on the seabed. After growing for some more months, the mussels are harvested again and reseeded at a final density of approx. 150 -160/m where they grow for another 2 – 3 years to harvest depending on site characteristics.

On our application we included ribbed mussels and blue mussels as they occur here naturally and sometimes can have significant settlement on our greenshell mussels. In the Marlborough and Coromandel areas, processors are starting to use blue mussels for powders and pet food. One day, they

might be a useful harvest item for us as well. We have scallops on the list of species but as they have little spat recruitment in Big Glory Bay, we will not be farming them unless we can access hatchery produced seed one day.

Bluff or flat oysters were originally on our list of species but as there were some submitters who were concerned about potential spread of Bonamia ostreae to the Foveaux Strait wild fishery, we withdrew this species from the application.

For the other species, we would only consider using spat and/or broodstock from local Stewart Island waters, except for the greenshell mussel spat. The greenshell mussel spat collection agencies have strict protocols around testing mussel spat for cysts of the toxic algae Catanella if it is present in Northland. In this case, the spat cannot be used unless able to be processed in an MPI approved "spat walking" facility, where it is separated from weed and cysts.

Also to prevent the spread of unwanted pests, we will only use new gear such as ropes, floats, anchors etc. or gear that has been used previously only in BGB (see Biosecurity Plan).

WILDLIFE BGB is home to a variety of seabirds such as penguins, gulls, terns, shags and oystercatchers to name a few. Perching birds such as gulls, oystercatchers and shags utilise the floats of a mussel farm to rest on when not actively feeding around the farms. Diving birds such as little blue and yellow eyed penguins are often seen feeding throughout the mussel farms in the bay. They will be feeding on the myriad of small larval fish that fill the waters through spring and summer, often including shoals of smelt, whitebait, pilchards and the ubiquitous krill. Yellow eyed penguins tend to feed under the farms on bigger fish such as spotties, or juvenile red cod.

Marine mammals are usually present in the form of Hooker sea lions, normally around the Bravo Islands and the outer BGB as their numbers slowly increase. Fur seals are now less common as the sea lions seem to have taken over. Bottle nosed dolphins are a regular visitor to the bay, while much less common are southern right whales (I have observed 5 different visits in 34 years working in the bay). I did see a pair of humpback whales once, and an elephant seal and common dolphins each about 3 times. Twice the common dolphins were 3 in number and may have turned up because of the presence of a cruise ship in nearby Paterson Inlet on the same day.

None of these animals has ever had a problem navigating around or even through the marine farms to our knowledge. Southern Right whales, dolphins and seals are so spatially aware they never tangle or strand.

Hectors dolphins have never been sighted on the Stewart Island side of Foveaux Strait to our knowledge.

NAVIGATIONAL SAFETY I specifically mention this issue as it has been noted in the submission from Sanford Ltd. We have endeavoured to keep the sites away from the navigational channel that leads all the way up to the head of the bay, as this is still a designated anchorage area on charts. The channel is lit at night with approved red and green marine lights positioned on the corner floats of pertinent Marine Farms. They also have radar reflectors and reflector tape to help mariners to navigate the channel at night or in poor visibility.

Unfortunately the map of BGB supplied with documents in the public notification on ES's website was an incorrect one and showed our Site 1 up against sites Li 474 and Li 366. Sanford Ltd was rightly concerned that this farm site would block an ancillary channel that runs along these sites on the north side of the bay up to Li 320, which is a fallowing salmon site and will be used for salmon cages again in the future. This channel is vital for the movements for large vessels and salmon cages as fish are moved from smolt farm to production farm etc. and, in the event of a toxic algae bloom, allows for movement of cages out of BGB to the refuge site in Paterson Inlet.

The correct position of the site is rotated 90 degrees clockwise and slid in a south-east direction about 100m. Sanfords are satisfied that the correct position of site 1 allows for their access.

OTHER POINTS raised in the Sanford submission.

To quote: *"Alter hydrodynamic processes, particularly water circulation patterns and phytoplankton distributions in BGB. These changes have the potential to adversely affect the performance of Sanford's existing aquatic activities".*

As to water circulation patterns, the literature shows that water currents within BGB are weak, less than 5 cm per second further into the bay, and up to 10–12 cm per second nearer the sides and the mouth of the bay, unless wind driven, when forcing is much increased. The water will slow down going through a mussel or salmon farm but speed up under and around such structures to compensate. This can assist in

mixing of grazed and ungrazed water once it has left a mussel farm. Our proposed mussel lines would be aligned largely with the prevailing wind and current to avoid impeding water circulation and flow.

As to phytoplankton distributions, we think this is not an issue now. If we looked at Sanford's recently successful application to effectively raise the nitrogen cap for BGB to 659 T N/year this allows for an extra 176 T of nitrogen per year through salmon feed inputs to the bay. N is considered to be the limiting factor for phytoplankton production in BGB.

Also in Sanford's recent application, supporting information was supplied (BGB Benthic and Water quality sampling 2016/2017 by ADS Aquadynamic Solutions, pg 11 table 1), showing nitrogen loading from salmon feed into BGB from July 2016 – June 2017 was a total of 370.4 T.

We consider there is a mistake here, the figure of 4 T for Feb 2017 seems to be an order of magnitude too low, compared to the months around it, so if we make this 40 T the total N input can be said to be 406.4 T for the year. This 406.4 T was released from the feed for approximately 3,500 T of harvested salmon (AEE of expanding salmon farming in BGB, Part 1 James, Hartstein, Giles - 26 April 2018). The difference between 406.4 and 659 T N/yr, which is now the allowed maximum N input, is 252.6 T.

That is 62% MORE Nitrogen than from current levels.

From Sanford application AEE 16 Nov. 2017 Part B, Section 4.8 pg. 50, Sanford has offered a compliance limit in terms of Chlorophyll a levels to *" Increase the average excess of Chl a in BGB by no more than 4 µg/L at the surface"*

Considering recent annual average Chl a levels for BGB lie somewhere between 1 and 1.5µg/L, we see that there will be considerable extra Chl a (phytoplankton) available for mussel consumption in the near future if the increase would be in the order of 2 – 4 fold (BGB Salmon Farms Change of Conditions Application - Technical Review by NIWA 3.1 Water Quality pg.6)

Again from the Sanford application, from ADS Aquadynamic Solutions, Vol 1, main report, pg 34:

" Mussel farms act, albeit indirectly, as a mitigation measure limiting the impacts of extra loadings to the environment by consuming the algae as they grow from the additional loading from the fish farms".

We think the issue is not lack of phytoplankton but rather a question of how do we crop all this extra potential phytoplankton production especially if our application is declined?

To exacerbate this need for more mussels, in Sanford's notified hearing 11 March 2019, Ali Undorf-Lay, (Sanford Industry Liaison Officer) stated in her evidence, point 14, "*and we used to both 'in-fill' and farm areas 'in fallow' with mussels. Sanford does not do either now. Sites in fallow are fully rested*."

This change is no doubt to assist in remediation of the seabed during the fallowing period, a worthy goal. It now means that there will be a number of sites that no longer hold mussels. Our estimate of the areas now not farmed is set out in the following table:

TABLE SHOWING SANFORD'S FORMER MUSSEL FARMS NOW VACANT OF MUSSELS

6Ha	(Sites 246 (3 ha) and Site 323 (3Ha) combined)	Mussels, combined 6 Ha Site 246, now salmon, will be fallowed empty
12Ha	Site 249	Mussels, then 5 years salmon farm recently, now empty and fallowing
3-4Ha	Site 320*	Formerly salmon, then 1 cycle of mussels, now mussel lines being removed to fallow
6-8Ha	Site 339 Site 340	Mussel farms from late 1990's when Regal Salmon left, until 2013. Now Site 340 is smolt farm and 339 is fallow after a period as smolt farm
3Ha	Site 321**	Mussels or oysters since 1990, mostly re-moved. It would appear to be swapped as brood stock rotation with Site 338.

* Site 320 has only had one cycle of mussels and has always been a salmon site. For this reason we will not include it in the calculation.

** From the Sanford application, it would appear Site 321 of 3Ha will be rotated in conjunction with Site 338 to carry or fallow the brood stock farm.

This table shows the double whammy effect, with up to 62% MORE N available for phytoplankton production and a reduction in mussel farming hectares from its peak of several years ago by a minimum of 18Ha up to 29Ha, depending on how Sanford's smolt and brood stock farms are fallowed.

This really shows how necessary it will be to increase the amount of mussel farming in BGB in future years to help balance the aquatic ecosystem of that productive bay.

Jim Maass-Barrett and Zane Smith
31 August 2019

Notes on BIOSECURITY MANAGEMENT PLAN

Marine farming requires the stock to be underwater out of sight most of the time, so it is vital for staff to be the eyes on the water, watching for any unusual stock appearance, behaviour or mortality, and any new or unusual species showing up on crop or other farm infrastructure such as ropes and floats.

Apart from diving for observation, which is not always practical or efficient, the two main opportunities for sighting all the crop at once are during harvest for reseed or final harvest, and while tending lines, tying on floats. Knowing what is normal is important and comes only with experience and training, so that when something new (pest or not) shows up, it is reported and the steps to be taken to treat and deliver samples to an authority are done properly.

There are several identification publications available, one from the former Mussel Industry Council (now Aquaculture NZ) some from MPI's Biosecurity Agency –Hotline 0800 468 233 or 0800 80 90 66 or Environment Southland's Pest Management Strategy Ph 03 211 5115, and AQNZ's NZ greenshell mussel Environmental COP (2007). And of course all the on-line assistance from the above agencies can now be accessed easily, including Cawthron and NIWA expertise.

In Big Glory Bay we are primarily growing greenshell mussels and as the area is isolated from other growing areas there is less chance of unwanted organisms being accidentally moved into there. We have hopefully learned from the introduction of the two different strains of Undaria that afflict Halfmoon Bay in one case, and Paterson Inlet and Big Glory Bay in the other. Then there was the calamity of Bonamia ostreae decimating our growing flat oyster industry recently.

ES's current standard consent conditions allow for greenshell mussel spat to only be sourced from 90 Mile beach near Kaitaia in Northland. The spat is seeded onto its own line normally, some farmers have a whole site dedicated to growing spat so there can be good isolation from other year classes. All the spat stays in BGB until harvest and, when it is seeded out, the numbers of metres going onto a particular line is measured and recorded.

As part of normal operations there are several agencies that have involvement and oversight of different practises. Maritime NZ issues Marine Transport Operator Certificates (MTOC), and the operator plan (MTOP) has strict protocols to follow for things like spillages, waste materials/rubbish, hazardous goods, etc. Environment Southland also has a pollution Hotline (03 211 5245) for spills etc. Vessels and vehicles involved in harvest for consumption have their own food safety and hygiene protocols through MPI/NZFSA.

Any vessels changing ports should have a recent hull clean and if going to sensitive places like Fiordland, a clean vessel pass is required.

In the standard ES Schedule of Conditions for Coastal Permits, Section 7, Section 8(a) and (b), and Section 9 (g), (f) and (h) are applicable to this section.