BEFORE SOUTHLAND REGIONAL COUNCIL

UNDER The Resource Management Act 1991

IN THE MATTER OF Applications by Jim Maass-Barrett and Zane Smith for 16 ha of new mussel farms in Big Glory Bay, Stewart Island

BY **Sanford Limited**
Submitter

STATEMENT OF EVIDENCE BY JACOBUS (JACO) JOHANNES SWART

12 SEPTEMBER 2019

INTRODUCTION

1. My full name is Jacobus (Jaco) Johannes Swart.

BACKGROUND

2. I am the Big Glory Bay Salmon Farm Manager for Sanford Limited (*Sanford*). I have held this position for two years, prior to which I was the farm's production manager overseeing the grower fish. I undertook that role for 1.5 years. I have worked for Sanford for six years in total in Big Glory Bay, with a break between 2012 and 2016 when I was the manager at High Country Salmon. I have also been the manager for Benmore Salmon. High Country and Benmore are freshwater salmon farms located in the central South Island.

3. I have the qualification of Master of Agricultural Science, majoring in Animal Physiology from University of Stellenbosch, South Africa. I specialised in aquaculture.

4. I have been involved in the farming of finfish and salmon since I graduated from university some 28 years ago. I have an in-depth knowledge of all aspects of the aquaculture fin fish industry, both in New Zealand and internationally.

5. I am very familiar with Big Glory Bay, Stewart Island.

6. I am authorised by Sanford to give evidence on its behalf. I have read the applicant's information about this proposal.

SCOPE OF EVIDENCE

7. The purpose of my evidence is to set out:

   a. A description of our salmon farming operations, both as they exist now and how they will change over time.

   b. How the activities proposed by the applicants will adversely affect our salmon farming operations now and in the future.

   c. Address matters raised in the applicant's evidence.

d. Address matters raised in the section 42A report.

e. My summary and conclusions.

SANFORD'S BIG GLORY BAY SALMON FARMS

Overview

8. As Mr Culley explains in his evidence, Sanford has been farming salmon in Big Glory Bay since 1993 when it purchased Big Glory Bay Seafoods. Marine farming in Big Glory Bay is providing good jobs to both locals and Southlanders more generally. Sanford alone employs more than 100 staff full time growing and processing salmon product from the Bay. Our Havelock based mussel plant processes Big Glory Bay mussels when Marlborough mussels are not in season.

9. While reference is often made to the Sanford business having one salmon farm, it is in fact three (soon to be five) separate farming areas, noting that the locations of these change periodically, as I will discuss in more detail later in my evidence:

   a brood stock farm which as the name suggests contains breeding fish. There are 12 pens, each are 12 x 12 meters;

   a smolt farm where small fish are raised after they have been transferred to the island from our hatcheries. There are 10 pens, each 30 x 30 meters; and

   a grower farm where fish are grown to market size of 4.5 kg. There are 16 pens, each 30 x 30 meters.

10. The grower farm has between 50-60,000 fish in each pen depending on the time of year and customer specifications, meaning that this farm contains close to 1 million fish weighing between 1.5 and 4.5 kilos. To sustain fish health and growth, it is important that the pens have the maximum available water flow, which can be a challenge in the Bay when mussel lines are too close to the pens.

11. The brood farm holds the breeding fish in all year classes and contains between 3000 and 4000 brood fish at any one time. Fish density in the brood pens is low, and the pens are fixed in location. Brood fish are identified with a pit tag, and those that are graded out at 16+ months and surplus to requirements are

donated to the Stewart Island community. Once a year the Balclutha Lion's Club come and assist in a grading and take the surplus fish for a charity event.

12. The smolt farm takes juvenile fish raised at one of our freshwater hatcheries at a weight of about 25g and carries them through to 1.5 kilos, a process that takes between 10–12 months. The juvenile fish are introduced into Big Glory Bay three times a year in order to ensure that there is a constant supply of market-sized fish available throughout the year. To fill one fish pen on the farm with 120,000 smolt takes four trips with the San Hauraki steaming over from Bluff. All up the San Hauraki smolt run is 40 trips a season.

13. The juvenile fish are hand fed for the first 2 weeks after arrival and then fed with the auto feed system. Underwater cameras are used so as not to waste feed. Once fish reach a weight of 1.5 kg they are graded by size, and moved to the grower farm in a transporter pen. They are transferred to the grower farm and will stay there until they reach market weight of 4.5 kg, a process that typically takes a further 12 months.

14. The layouts of the various farms are shown in Figure 1.

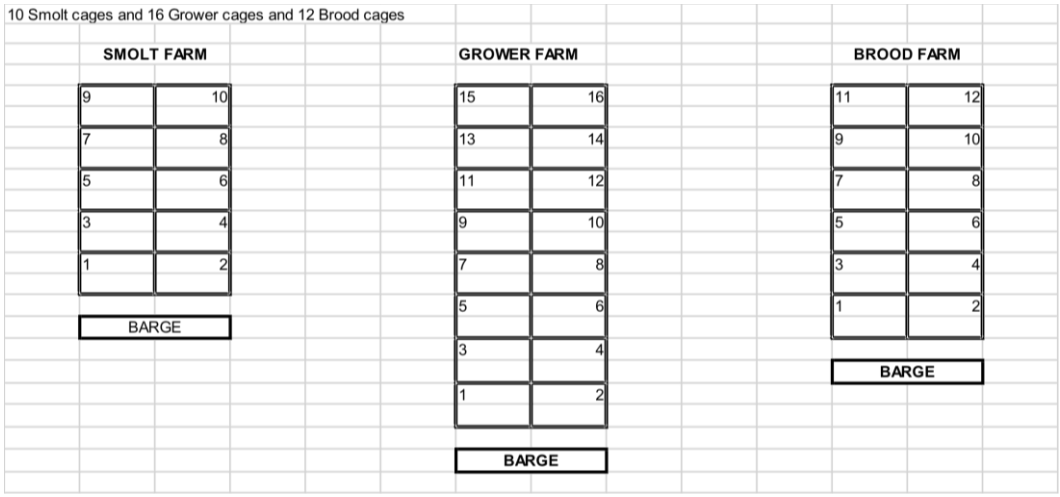

Figure 1: Current layout of the farm, 2019

15. The Big Glory Bay salmon farms are supported by three freshwater hatcheries, one on the Waitaki River, one on the Clutha River and a supplementary hatchery on the banks of the Waimakariri River.

16. The salmon farms are supported by our office team in Bluff and an on-water administration office and staff quarters on the Kiwa barge. The Kiwa is attached to the salmon grower farm and is the hub of our Big Glory Bay operations. There are two on-site engineers in Big Glory Bay, and an engineering team and processing plant in Bluff. All such personnel also assist with mussel farming operations, as and when required.

17. There are 5 Sanford vessels based full time in the Bay to service the salmon and mussel farms, and one service ferry/work boat – the San Braz. As I will discuss later, the San Hauraki also comes over at least five days a week year round from Bluff to transport supplies, including fish feed, into Big Glory Bay and transport harvested fish to our Bluff factory for processing.

18. Also, a permanent commercial dive team (4 – 5 staff) works five days a week, and services both the salmon and mussel farms. The dive team has their own boat.

19. The Stewart Island water taxi service frequently ferries people to the farm, sometimes visiting two times a day. They bring out contractors, farm visitors or farm staff who are starting their shift.

20. Most days the Sanford salmon farms have 22 staff on the farm, and often more when contractors are on site. The Sanford mussel farms in the Bay have five full time staff (there is currently four staff and one vacancy) and two vessels operating year round.

21. Our farming operations require us to regularly move both our farms and our fish across Big Glory Bay to our various marine farm consent areas. Whole farms are moved to different areas as part of the fallow and rotation process, which I discuss below. And fish are moved in transporter pens between the smolt, grower and brood stock farms at different stages in their growth cycle.

22. At the moment, both the grower and smolt farms are routinely relocated in a cycle of 2 years farming and 5 years fallow and the farms are relocated with fish inside the pens. This farm-fallow-relocate pattern is unique to Sanford. I am not aware of anywhere else in the world where salmon farms are routinely moved with biomass inside the pens.

23. Sanford made a voluntary decision in 2017 not to put mussel farms on our fallowed salmon sites, but that was just a snapshot in time and we are constantly adapting our operations. Importantly, there is no consenting limitation that prevents us from farming mussels on salmon farm sites that are being fallowed (or rested), as the applicant has asserted. We have done this in recent times so we can clearly understand how the seabed responds to fallowing, as this is a response that is best measured without any influence by mussel farms immediately above. For the last three years we have been working with the Cawthron Institute on a Seafood Innovations grant (see **attachment 1**) to improve the benthic habitat recovery process under fallowed salmon farm sites and I expect that in the near future we will choose to actively farm mussels on many of these.

OPERATIONAL AND NAVIGATIONAL CONSTRAINTS

24. To provide context for the following section of my evidence, Figure 2 below shows the locations of all existing salmon and mussel farms in Big Glory Bay and, in the red boxes, the three proposed new mussel farms that are the subject of this hearing. I have taken this map from the s42A officer's report. I understand that the applicant has also supplied an updated map with some changes to the locations of the proposed farms. This does not alter the concerns that I discuss below.

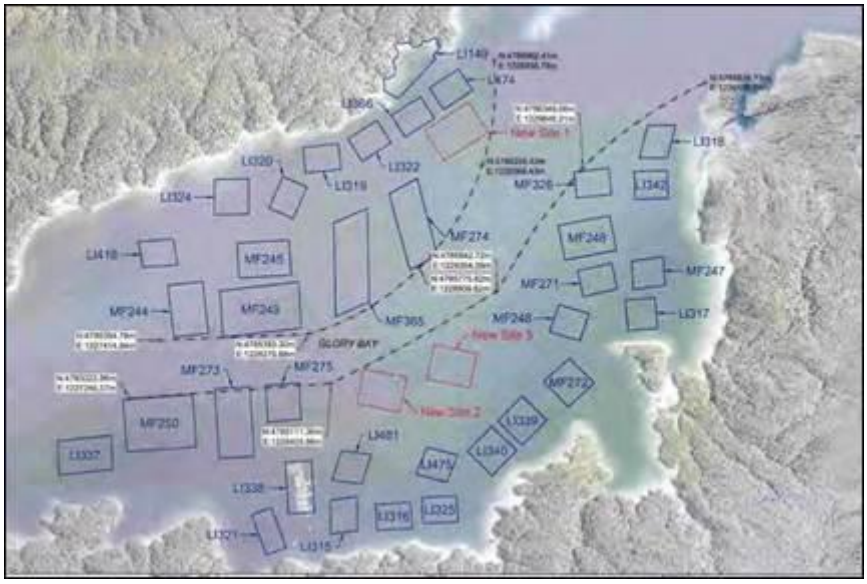

Figure 2: Farm locations and navigation routes

25. Considerable effort goes into coordinating the Sanford salmon and mussel farm operations so that the farm programmes are not in conflict, and that their work programmes and vessel requirements align – for example the mussel barge may assist on the salmon farm or the Mussel Manager may be asked to remove lines from a mussel farm to improve vessel access for completing a salmon farm relocation. This same flexibility is not possible when a mussel farm is owned by others.

26. By way of example, if the Applicant's proposed Site 1 of 6 ha was developed Sanford's access to salmon farm sites MF 366 and MF 474 for fish transfer or farm relocation would be prevented and the sites could be rendered un-usable. Mr Eriksson explains the safety and navigation problems that the proposed sites would create for Sanford's operations further in his evidence. The key navigational and safety issues arise in two scenarios – when farms and fish are being moved from one consent area to another and when vessels are navigating around the farm areas in the course of their day to day work.

Moving farm pens and fish

27. Moving fish in pens is a highly skilled and specialised process. It takes several months of planning for each move, including chartering auxiliary vessels, having

extra staff on the farm and having a team of contractors and electricians etc. on duty to quickly follow up the move with stabilising and reconnecting the equipment. The moving process itself takes three or four days to complete.

28. Moving pens requires space – there are a lot of vessels and people involved, precision and experience is crucial. It is a high pressure job. The more space there is for vessels to manoeuvre the safer, and easier it can happen.

29. If the access to the new area where a pen is to be located is too tight for our larger vessels to turn, or we cannot position and anchor the farm correctly, then our salmon farm sites cannot be used.

30. A service barge is located at one end of each of the active three farm areas. The barge also operates as a feed storage and silo. The feed is contained in 1 tonne bags that are lifted into a hopper with a hoist from the supply boat. In a farm relocation the pens, and then the barge, are moved.

31. Fish are transported between the smolt farm and the grower farm when they reach a weight of 1.5 kilos. The 'transporter pen' that is used to do this is pushed very slowly with a work vessel. For some of these moves fish are relocated to the opposite side of the Bay, depending where the grower farm is located relative to the smolt farm, noting that it is good biosecurity and fish health practice not to have all the actively farmed areas located next to each other. While transporting fish in one cage is quite different to moving the entire farm, it can be just as complex, and in all relocations the work vessel needs to maintain as straight a line as possible, and keep the transporter pen steady and upright so as not to stress or damage the fish.

32. For all fish transfers (and farm relocations) Sanford takes out additional insurance because it is a high risk situation and a mistake could mean that the fish are either stressed (and subsequently die) or escape – both scenarios would have significant financial consequences, as there are typically 60 - 65,000 fish in one fish transfer and King salmon are particularly susceptible to stress.

Vessels moving around the farm areas

33. Vessel access to and from Big Glory Bay is constrained as the bay is semi-enclosed and there is only one way in and back out, as Mr Eriksson discusses in more detail. Mr Eriksson also describes each of the Sanford farm vessels and their role and duties in Big Glory Bay in more detail. I make a few additional comments below. As well as the salmon farm vessels described below, Sanford also has various vessels associated with mussel farming in the Bay.

34. Sanford has eight vessels in Big Glory Bay five days of every week. We bring workers into the bay on the San Braz – a larger vessel which we also use to move workers and barges between farms and the San Hauraki, which comes over from Bluff.

35. A net cleaning barge moves between the farms on a regular basis and is towed into place by another vessel. The net cleaning machine is run by four dedicated technicians across two shifts. Since 2016, when Sanford voluntarily stopped anti-fouling its nets for environmental reasons, the net cleaning technicians have been working every day of the week, year-round.

36. Since 2018 the grower farm has reverted to a previously-adopted practice of adding dissolved oxygen to the pens. This augments natural oxygen levels in the event of an algae bloom, jelly fish invasion or extended periods of calm weather. This time, we are utilising an oxygen barge carrying compressed air tanks. Similar barges are also being installed on the brood and smolt farms.

37. Fish are harvested by a separate harvest barge that moves along the row of pens and is tied up alongside the pen being harvested. It usually takes three to four days to harvest a pen. Harvested fish are hoisted in large plastic bins filled with ice onto the San Hauraki for transporting to Bluff for processing. We also have a barge for grading fish.

38. The San Hauraki is Sanford's largest vessel working on the farm. She brings in salmon feed, which are dry pellets in one tonne bags and returns with fresh processed salmon and harvested mussels. She also brings across farm maintenance gear, mussel floats etc. and takes back rubbish, equipment and nets

that need to be repaired – or even tows other barges back to Bluff when they require their Maritime New Zealand survey.

39. At times the San Hauraki can do extra-ordinary trips, for example last summer she steamed in seven days each week for an extended period. Often over long weekends the San Hauraki is used to move extra feed, or bring barges back to Bluff, or tow out barges. Any major tasks that she cannot do during the week will be done over weekends.

40. From time to time the San Hauraki is also supplemented by the Fouveax Freighter or the Marine Countess, which are also larger vessels**.**

WATER FLOW EFFECTS

41. Mr Culley explains in his evidence, our concerns about this proposal are its effects on safe and efficient navigation around Big Glory Bay and the effects of reduced water flows on salmon and mussel farming operations.

42. Sustaining adequate water flow through our salmon farms is critical for maintaining fish health and sustaining water quality and benthic habitats in Big Glory Bay. As Mr Culley explains in his evidence, and I agree, we are concerned that the proposed new mussel sites have been located such that water flows in Big Glory Bay will inevitably be restricted, to the detriment of our ability to farm salmon. These concerns about water flow in Big Glory Bay are very real. If mussel farming activity occurs in the bay close to, and "up-current " of, our salmon farming operations, which currently produce 20 million salmon farm meals a year, those farms could block the water flow. This will detrimentally affect the health of our salmon and put our farming operations at risk.

43. Mr John Engel has discussed water current and the effect that a mussel farm has on disrupting flow in paragraph 29 of his evidence, where he says "*Water tends to move around the farm rather than through it and eddies can be created "downstream" but, given the generally low tidal flows in the bay, these effects are difficult to discern visually."* I am concerned that this does not answer our concerns – just because an effect cannot be discerned visually does not mean it is not there. As a salmon farmer I need flowing water through the water column at all depths of my pens to bring oxygen to my fish and for fish health.

FUTURE OPERATIONS AND EXPANSION

44. As Mr Culley has explained, fish numbers on the salmon farm will significantly increase over the next few years, following Sanford being granted variations to its existing resource consents earlier this year.

45. When our new barge arrives (expected in July 2020) the grower farm will split into two separate farms. In 2022 we anticipate also splitting the smolt farm in the same way. So, by 2022 we will have five farm areas, not three.

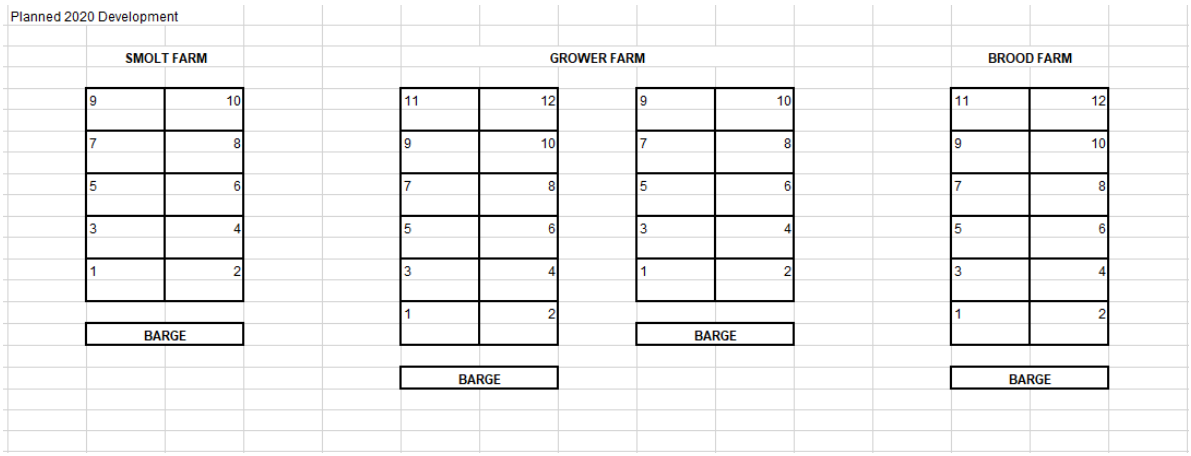

Figure 3: Anticipated layout of the farm, 2020

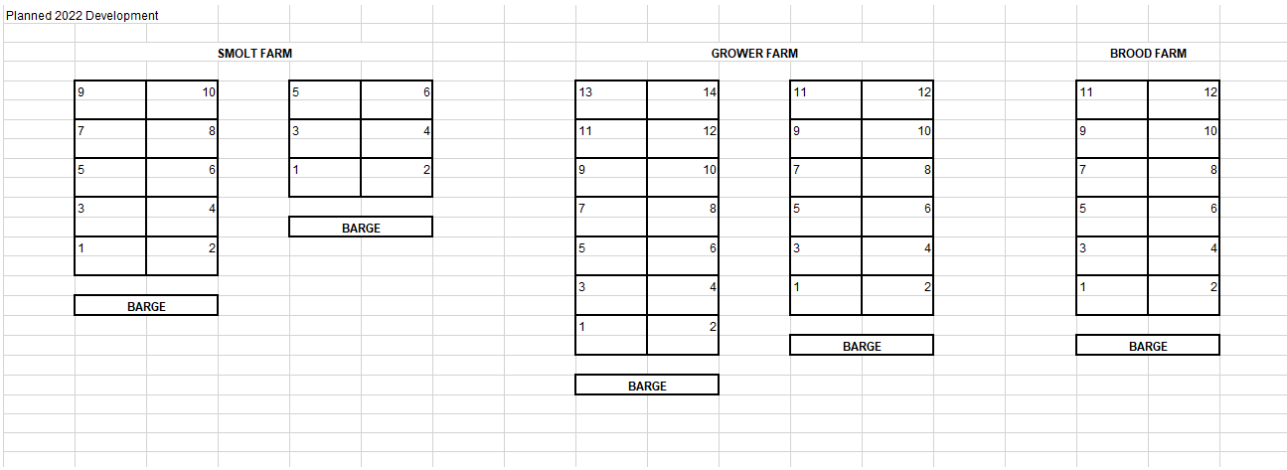

Figure 4: Anticipated layout of the farm, 2022

46. A fourth hatchery, set to deliver the smolt required for the salmon farm expansion consented in April 2019, is already in the planning stages and will begin supplying our out of season smolt to the farm by 2022. The new barge to service our grower farms mentioned above has been commissioned and is being engineered in Tasmania.

47. This anticipated growth means that all of the activities that I have described above, including activities such as grading, relocating pens and barges etc. will also double in intensity. There will likely be three more barges, at least two transporter pens, bigger transport vessels with larger hull capacity, or multiple large vessels, and much more activity. This will make the bay more complex to navigate.

SUMMARY OF CONCERNS

48. Regarding navigation, there is always a lot happening in the bay and a lot of vessels and smaller boats are moving people, fish or mussel product around. Vessels are also going between farms and sometimes even between mussel lines to get around.

49. There are at least eight Sanford vessels working in the bay at least five days of every week, often more. There are also three other aquafarmers that operate vessels year-round, recreational charter boats, occasional pleasure craft and a myriad of water taxi visits frequenting the Bays. This is discussed in detail by Mr Eriksson.

50. Constant vigilance (and monitoring) is needed to ensure boats, people and the food we grow are all kept safe.

51. As I have outlined, these new proposals will, if consent is granted and implemented, seriously compromise our ability to navigate safely in and around Big Glory Bay. It would also seriously constrain our current and future salmon farming operations and render certain sites inoperable.

MATTERS RAISED IN THE APPLICANT'S EVIDENCE

52. I take this opportunity to clarify a statement made in Mr Jim Maass-Barrett's evidence, page 7 where he reports on a comment made by my colleague Alison Undorf-Lay, Industry Liaison Manager, in her evidence at the Sanford Variation hearing where she said *"…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 was factually correct at the time the statement was made. However it is unlikely to always be the case. In the future, Sanford is likely to put mussels in while sites that have been used to farm salmon are in fallow. Sanford is fully entitled to do this under its consents. It is not correct for Mr Maass-Barrett to conclude that there will be a number of sites that no longer hold mussels because they will be in fallow after being used for salmon farm operations.

53. There are 45.5 hectares of marine farming consent areas in Big Glory Bay that are permitted to grow King salmon and Greenshell mussels, scallops, blue mussels and oysters etc. Sanford has 36.5 hectares of this in sole ownership and an additional nine hectares in partnership with others. The nine 'partnership' hectares are currently farmed in mussels. The 36.5 hectares are currently in the salmon 'farm-fallow' rotation and in the future could well be farmed in mussels during the fallow.

54. I wish to also speak to the comment in Mr Maass-Barrett's evidence, page 5 under Navigation Safety where he says that, *"Sanford are satisfied that the correct positon of site 1 allows for their access".* Over the last year with Alison Undorf-Lay I have personally attended several informal chats with Mr Maass-Barrett. Never has Sanford said that its concerns with Site 1 are resolved.

55. It is unclear to me if Mr Maass-Barrett's evidence titled 'Notes on Biosecurity Plan' is the plan suggested by the Officer on page 20 of the Officer's Report:

> "*Given the late notice of the further information request it is unlikely that this proposed biosecurity management plan will be completed prior to this report being published. However, it is expected that this management plan will be completed prior to the hearing, which will allow the content of the plan to be discussed by submitters as part of the hearing process*."

56. Sanford has not specifically raised biosecurity matters in its submission and I personally have no Greenshell mussel expertise in this regard. From a salmon farm perspective though, biosecurity is crucial for fish health and wellbeing and I would be most concerned if the Plan as proposed was accepted.

SUMMARY AND CONCLUSIONS

57. Overall, I have concerns about the effect that the application will have on Sanford's marine farming operations in Big Glory Bay. In particular, the effects on navigation and on water flows. I have not seen evidence in the application of an assessment of these effects such that I can have comfort they have been addressed.

Jaco Swart

12 September 2019

Attachment 1

FAST TRACKING SEABED RECOVERY
Changing fallowing practices for environmental wellbeing

Olivia Johnston - Cawthron Institute, Nelson, New Zealand

Introduction

Industry partners are working alongside Cawthron Institute to develop an 'under-pen' remediation approach that reduces finfish farm (Figure 1) fallowing times and accelerates benthic recovery.

A previous project (Stage I, Keeley and Taylor 2015) identified removal of the top 5-10 cm of enriched sediment as a viable solution, promoting successional macrofaunal recolonisation and increased bioturbation.

In this study (Stage II) we propose larger semi-commercial scale enriched sediment removal and aim to accelerate benthic recovery in comparison to traditional fallowing.

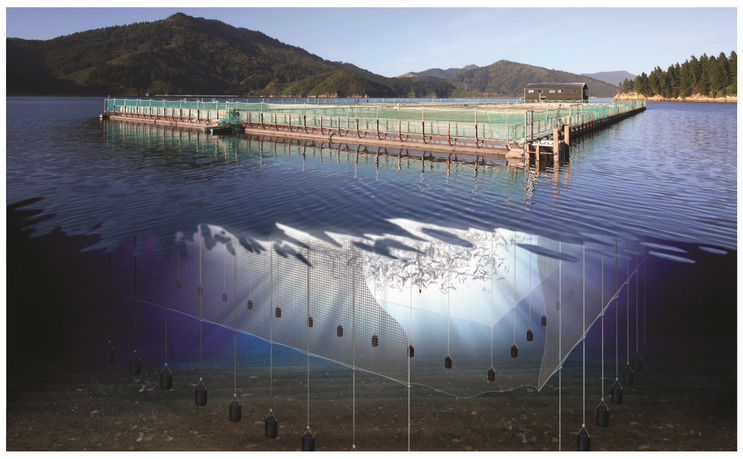

Figure 1. *A typical salmon farm structure with schematic of subsurface pens (image from www.kingsalmon.co.nz).*

Background: Stage I

In Stage I (Keeley and Taylor 2015, Keeley *et al.* 2017) the remediation treatments tested were:

- **irrigation** with oxygenated water (for 12 hrs) – repeated three times over two months
- **harrowing** (heavy raking of the seabed) – repeated three times over two months
- **surface sediment removal** – single treatment using a sediment plow.

Testing showed that the removal of enriched surface sediments altered the physical, chemical and biological properties of the sediment, facilitating recolonisation by infauna.

Removal treatments created localized, near-bottom sediment plumes with reduced dissolved oxygen levels and increased turbidity, for up to 90 minutes following treatment.

Further investigation into commercial implementation of the approach, sediment disposal options and consideration of larger-scale effects was recommended.

Figure 2. *The three remediation treatments tested in Stage I.*

Proposed semi-commercial enriched sediment removal system: Stage II

The most feasible sediment removal approach was determined to be vacuum dredging (top 5-10 cm of seabed) and mechanical dewatering (Johnston and Taylor 2018, Figure 3). All removed sediments will be dewatered on site, with excess seawater returned to sea and dewatered sediments used in land-based applications (e.g. as a fertiliser).

The level of benthic recovery and short-term water quality effects will be assessed using benthic and water quality parameters in a before, after, control, impact design. Sediment quality sampling will commence just prior treatment, then 1 week, 8 weeks and 18 weeks following the treatment.

Water quality will be measured by deploying instruments (e.g. dissolved oxygen and turbidity sensors), drogues (to follow plume path) and taking water samples (by van Dorn) at set time intervals, immediately down-current of the plots before, during and after treatment.

The ultimate success of the remediation tool will be determined by:

1. Evidence of improved seabed recovery compared to traditional fallowing.
2. Operational environmental effects being low-risk.
3. Sediments able to be used for land-based applications (e.g. fertiliser).
4. Ease of use/application and cost-effectiveness.

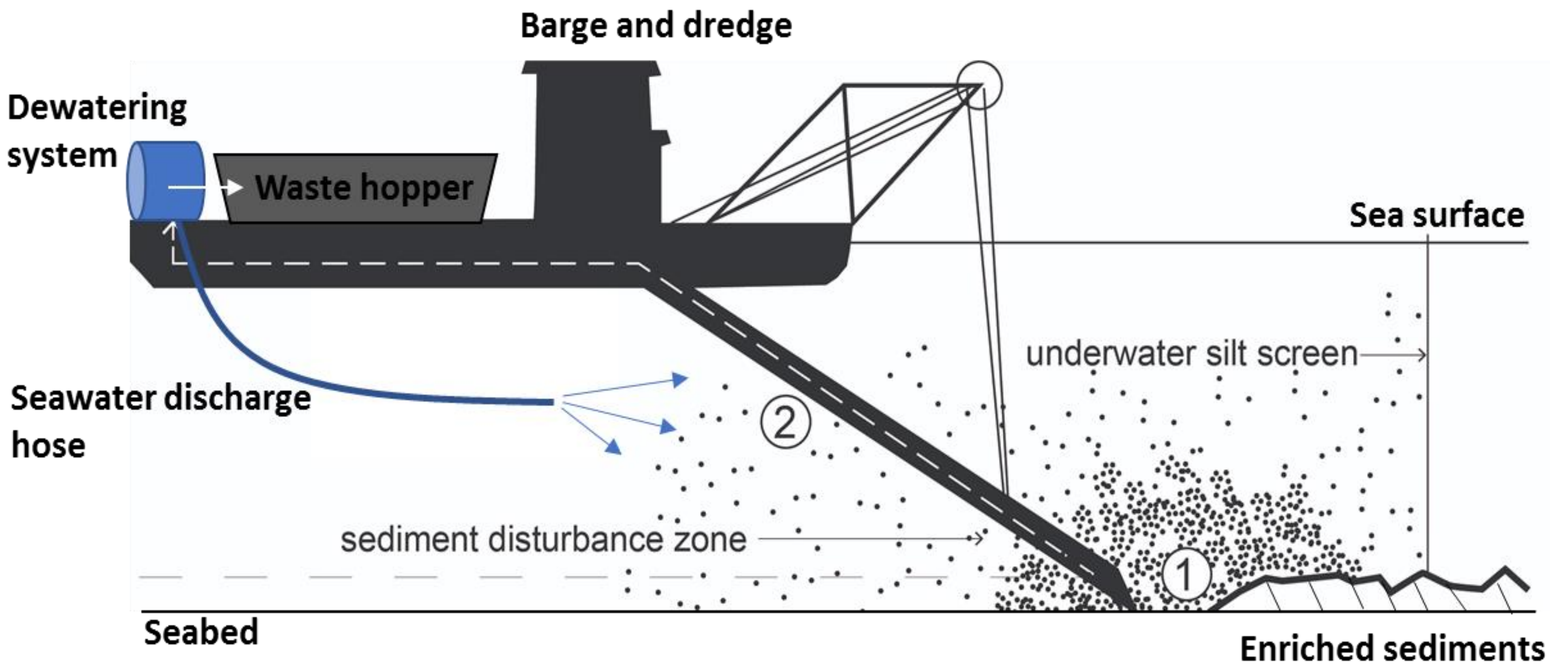

Figure 3. *Schematic diagram of a similar sediment removal system. (1) Dislodging of enriched sediments (2) raising of material to surface.*

Literature cited

Keeley, N. and Taylor, D. 2015. Seabed remediation pilot study. Prepared for Seafood Innovations Limited. Cawthron Report No. 2696. 39 p. plus apps.

Keeley et al 2017. Comparison of three potential methods for accelerating seabed recovery beneath salmon farm. Aquaculture 479; 652-666.

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Acknowledgments

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