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CAWTHRON MARLBOROUGH ENVIRONMENT AWARDS

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JUDGES' REPORT

MARINE

MARINE FARMING ASSOCIATION – PELORUS MUSSEL BED PROJECT

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INTRODUCTION

Pelorus Sound/Te Hoiere was once rich with natural self-sustaining mussel beds that provided kaimoana, a nursery for fish, and ecosystem services such as sedimentation filtration and stabilisation of the seabed.

Dredging and over-fishing in the 1960s-1980s decimated the wild beds of green lipped mussels, and the Marine Farming Association is behind a collaborative research project to try to restore them.

The initial impetus for the research was industry concern about the drop in local spat production. As the research developed, spat collection became a lower priority. The study is now focused on habitat enhancement and restoration of the wild mussel beds.



There are four project goals:

- Develop recommendations for future mussel restoration in the Marlborough Sounds.
- Provide efficient methods for monitoring the success of the mussel restoration for the future.
- Provide an understanding of how mussel bed restoration enhances biodiversity.
- Work with the community to educate and encourage people about mussel bed restoration.

GENERAL INFORMATION

The Marine Farming Association is an industry group representing marine farmers in the top of the South Island. It was established in 1974 and works to promote the interests of its members and the aquaculture industry in general. Members include mussel farmers, salmon producers and other farmed species including oysters, seaweed and pāua.

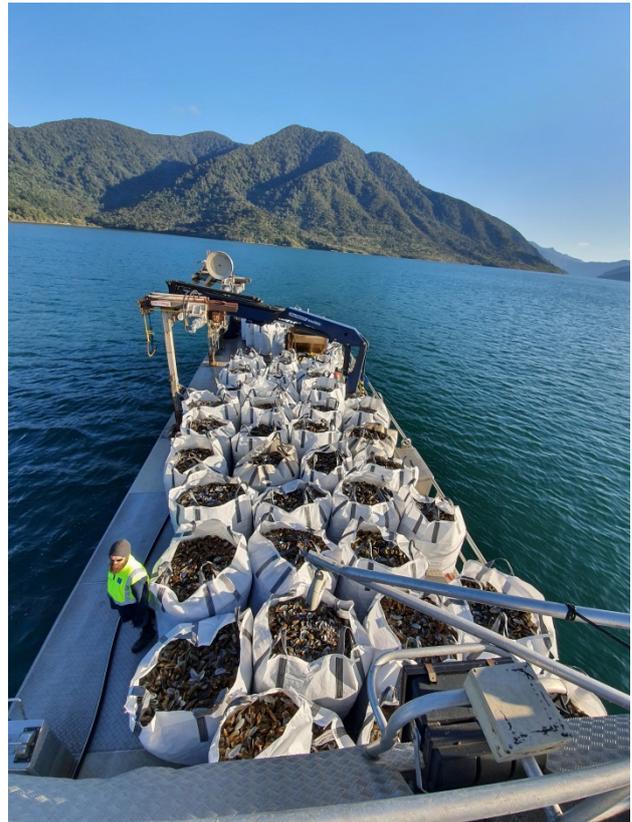
There are about 580 mussel farms in the Marlborough Sounds, which use lines to grow the green lipped mussels that once formed large beds on the sea floor.

In 2016 MFA was approached by two mussel farmers with the idea to restore the wild mussel beds as a way to produce mussel spat for the commercial farms. After discussing with members, MFA found there was widespread support for the project, including offers of cash and services.

MFA partnered with The Nature Conservancy, a global organisation that promotes collaborative approaches to conservation, the University of Auckland and NIWA and successfully applied to the Ministry for Primary Industries' Sustainable Farming Fund.

The three-year research project began in 2020 with funding of \$725K, including funding and in-kind support of \$215K from MFA and its members.

The project is the PhD research for marine ecologist and University of Auckland student Emilee Benjamin, who is based with NIWA in Nelson. The project has been organised as a staged approach:



1. *Develop a research plan based on the successful Hauraki Gulf project and international best practice:* This work was done by NIWA and laid the groundwork for the Pelorus trial.
2. *Identify potential research sites with appropriate seafloor environments and water conditions:* Five trial sites at 5 m depth were chosen based on sediment composition (ranging from mud to coarse sand) and previous mussel beds. Skiddaw, Te Mara and Weka Point are in Kenepuru Sound; Maori Bay and Grant Bay are in Pelorus.
3. *Install small trial mussel beds:* In January 2020, with the help of local marine farmers, four tonnes of farmed mussels were harvested off lines in clumps and put into bags.

These were very carefully placed into three 1.5 sq m plots at each of the trial sites.

Scuba monitoring was done at one, five and nine months to check growth of the mussels, the spread within the plot and what biodiversity was being attracted to the site.

Initial results are promising with high survival rates and almost double the spread at two of the sites. Predatory starfish are an issue at several sites. However, other sea life including crabs, sea cucumbers, worms, limpets and blue cod are more abundant, which points to biodiversity benefits from the new beds.

4. *Place shell material on the seabed to stabilise sediments:* This is a different trial approach. Rather than putting mussels directly on the seafloor, a base is built up on the sediment using mussel shells left over from commercial processing. Other studies have shown that this recycled shell improves mussel survival and recruitment, and increases biodiversity on the seabed. Two sites were chosen – Fairy Bay and Kenepuru Entrance at 12 m depth. Installing the base shells required a resource consent from Council and the work was carried out in August 2020 with the help of marine farmers and NIWA divers.
5. *Install larger trial beds:* Live mussels are due to be added to the built-up beds in early 2021. Again, the mussels will be placed in clumps to bind on to the built-up layer of recycled shells. At 18 sq m, the plots are significantly larger than the first trial. More plots of this size will also be created on the mud seafloor as a control.
6. *Assess the performance of the trial mussel beds and monitor species abundance and diversity:* Years 2 and 3 of the research project are focused on monitoring the beds and surrounding area to see what effect the restoration efforts are having. As well as mussel survival and biodiversity, scientists will be checking for recruitment of juvenile mussels.
7. *Trial in shallower water:* A third trial is being planned at 1m low-tide depth to assess mussel bed survival in shallower water. These closer-to-shore sites would enable more community involvement and the opportunity to work with the scientists and raise public awareness about the risks of over-harvesting.

There has been some iwi engagement through Te Tau Ihu Fisheries Forum. MFA is building connections with Ngāti Kuia and hope to have more iwi involvement as success from initial results comes through.

MFA is also looking at how their research may be able to feed into stage 2 of Kotahitanga mō te Taiao Alliance's Te Hoiere catchment restoration project as it progresses from the land into the marine environment.

THE JUDGES WERE IMPRESSED BY

- **Industry initiative:** MFA is being proactive in developing and trialing ways to restore the mussel beds that may help mitigate the effects of sedimentation and dredging on the marine environment. The mussel restoration project may help address problems caused by historic fishing practices as well as land-based run-off.
- **Strong collaboration:** MFA is working with a wide range of stakeholders including University of Auckland, NIWA, MPI, mussel farmers, equipment suppliers and iwi. This broad-based approach helped in terms of funding and the quality of scientific research and will be further enhanced as community members get involved in the shallow water trial. MFA did well to get on board with the Nature Conservancy, which has a global interest in using bivalves for environmental restoration. There is potential in this partnership to scale up the project.

- Change in approach: This collaboration is a significant shift in thinking from an earlier defensive mentality in aquaculture and other primary industries. MFA is transitioning from an industry that has reacted defensively to public criticism to one that is taking affirmative action to environmental concerns. They have also accepted the risk of opening up to criticism that can come with increasing transparency.
- Value of science: MFA recognised the importance of robust research under-pinned by scientific monitoring and reporting, and they found the right partners to make this happen. This included learning from international and national experience and making improvements, such as carefully placing clumps of mussels to give them a head start, rather than distributing them randomly.
- Strong communications: Emilee is a strong ambassador for the project with an ability to explain scientific concepts in accessible language. Her regular newsletters keep MFA members up to date, and support and enthusiasm are growing as relatively low mortality results are reported. Excellent project information on the MFA website.
- Use of waste product: Building reefs from recycled mussel shells has dual environmental benefits – it is reducing the waste stream and providing a platform for restoration. Consideration of deliberate positioning in various sites within the Pelorus Sounds was a step-up from the Hauraki Gulf example.



PROBLEMS AND HOW THEY HAVE BEEN TACKLED

- Predator starfish: Monitoring at five months showed starfish are being attracted to the new beds and feeding on the mussels. The worst case was 140 starfish at Grant Bay, which also had the highest mortality rate of 16 percent. All starfish are collected and relocated 2 km away from the plots. The proposed third trial would also be a test to see if starfish are less of a problem in shallow water.
- Perception of dumping: This was one of the reactions to the concept of using old shells to build up the base of the bed. This perception will hopefully be replaced by greater public awareness and an understanding that this is recycling, and there would be a net environmental benefit if the beds are successfully established.
- Sedimentation and dredging: There is an ongoing risk of sedimentation from land use and damage to the seafloor if dredging is allowed to resume. Engaging with other stakeholders involved in the Kotahitanga mō te Taiao Alliance's Te Hoiere catchment restoration project would be an opportunity to try to reduce these risks.
- Ongoing commitment: The 3-year timeframe and funding for this project may not be enough for the kind of generational restoration required. If the results of the trial are positive, work needs to go into building an alliance of partners that enables a longer-term commitment.

SUMMARY

The MFA's Pelorus mussel bed project aims to address the issue of the loss of natural mussel beds and seeks to find reasons for why there has been no natural regeneration.

The project works on a number of levels – environmental restoration, marine farmer engagement and potential for community involvement, and sets a strong example for industry groups to take responsibility for the environment they operate in.

Although still at an early stage, the judges were impressed with the scientific approach, strong collaboration, and the potential to scale up the project as research and monitoring results progress.

SUGGESTIONS

- Develop a succession plan for when Emilee has completed her PhD.
- Consider allocating more MFA funding to extend the monitoring period beyond the current three-year research programme. Depending on results, it would be good to see restoration sites and effort scaled up. Currently these test sites are small and in out-of-the-way locations.
- Ensure research results are published in publicly accessible journals and reports.
- Start exploring how the mussel beds, if successfully established, could be protected in the future. For example, no-dredging zones or recording them as ecologically significant marine sites.
- The question of natural recruitment of juveniles/spat collection may still need addressing. Can this be worked back into the project in the future?
- Work with your partners to promote the project to build the profile and broaden public support. Talk about the health of the waterway and risks of sedimentation. Kotahitanga mō te Taiao Alliance and their Te Hoiere project may provide an opportunity to expand on this.
- Link up with the Marlborough Girls' College environmental sustainability course. They are looking for projects that can be built on year-on-year. Students may be able to pick up monitoring in the 1 m zone.
- Consider an "ambassador" network for rangatahi/youth that provides opportunities for Ngāti Kuia kaitiaki and college students to engage with local environmental restoration projects and to strengthen pathways for jobs within the aquaculture industry.
- Approach the Sustainable Seas National Science Challenge about including the mussel restoration project in their case study of the Marlborough Sounds. Tap into their marine ecology expertise, in particular to ascertain international best practice regarding starfish predation on mussel populations and how to address this.
- Strengthen the linkage between western science and mātauranga Māori, particularly with regard to ongoing monitoring. An example is the bi-cultural approach taken by Associate Professor Kura Paul-Burke to restore mussel beds in Ōhiwa Harbour. <https://www.rnz.co.nz/news/national/435432/saving-mussel-beds-with-a-bi-cultural-approach>