

Mussel Reef Restoration for Top of the South Island/ Te Tau Ihu

The mussel restoration project continues!

From 2019-2022 a collaborative research project was run with extensive support and collaboration from eight marine farming companies, the MFA, The Nature Conservancy, The University of Auckland, NIWA, and Te Tau Ihu Fisheries Forum, with funding support from the Ministry for Primary Industries.

We are extending the project for two more years with extensive support from the organizations listed above and many more including Manawhenua ki Mohua, Ngāti Tama, MDC, and DOC. The wider community collective supporting the project has developed a project plan which will build on the previous project and aims to:

- 1) Increase the effectiveness of mussel restoration by **developing methods for harnessing natural recruitment** into mussel beds in the Marlborough Sounds.
 - i. Start of that work reported in this Newsletter below.
- 2) **Assess the efficacy of recycling mussel shell from aquaculture** to enhance biodiversity and stability of seafloor habitats with accumulated sediment from run off.
- 3) **Extend the application of mussel restoration** methods developed for enclosed waters of the Pelorus Sound/Te Hoiere so they are effective in open coastal waters of Golden Bay/Mohua and Delaware Bay/Wakapuaka.

We have begun looking at new sites to deploy mussels and shell material within all three locations and have found intertidal mussel reefs in Mohua and Wakapuaka! These remnant mussel reefs can provide insight into wild mussel recruitment that may be able to help the restoration efforts.



Wakapuaka remnant intertidal mussel reef.

If you have any questions or comments about this project, please feel free to reach out to Emilee Benjamin via email at Emilee.benjamin@auckland.ac.nz.

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Untangling mussel recruitment

The Pelorus Sound/Te Hoiere Mussel Restoration Project has successfully trialled restoration efforts and has deployed over 50 tonnes of mussels. One of our key goals for this restoration project is self-sustaining populations, which means we need new mussels to recruit into the beds. We haven't seen any recruitment to our restored beds so far, so we wanted to try a new method to initiate recruitment. Specifically, we wanted to try deploying spat-filled seaweed, similar to what is used by the industry, to see if this could supply a source of new recruits.

Experimental design

We harvested wild seaweeds and hung them off a dock in Double Bay, Kenepuru Sound for two weeks. We've previously found this method to lead to large spat catches and had good luck with each seaweed sample catching hundreds of spat (both blue and green mussels). At the end of those two weeks, we brought 24 small trays out to Double Bay and filled them each with large rocks. Additionally, half of the trays each had 20 adult mussels (extras from a prior restoration effort) placed on top of the rocks. Finally, half of the trays (six with mussels, six without) each had a piece of the spat-filled seaweed strapped onto a rope suspended above them. All 24 trays were brought into the water in Double Bay and placed 2 m from one another in about 1 m of water depth on the low spring tide.

After one month we took half the trays to shore, emptied them, and took the rocks and adult mussels back to the lab to look for recruitment. After one more month we did the same thing with the other half of the trays to monitor continued survival of recruits.

Results and next steps

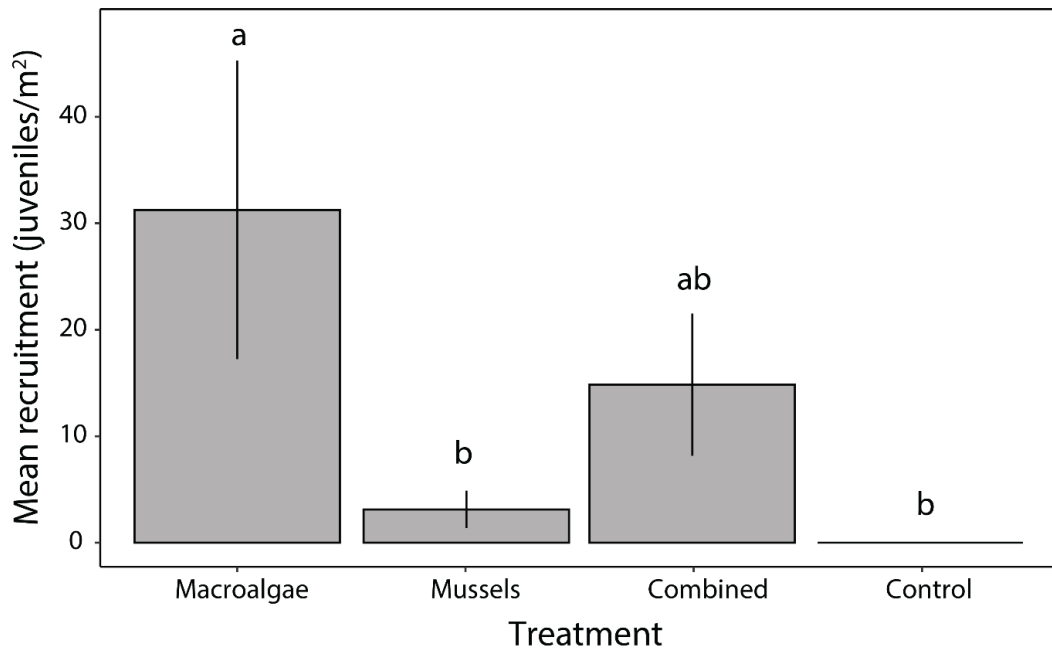
Juvenile mussels, blue and green, recruited into the rocks and adult mussels in the trays! However, we only saw significant recruitment levels to trays that we supplied with the spat-filled seaweed. This suggests that recruitment is possible in the area, but we may need to provide a source of recruitment-ready spat. We did not see any significant decline in recruitment over the two months but did see the recruits continue to grow, suggesting that mussels are able to survive after they recruit.

This was a small-scale experiment but has some promising results for our restoration efforts. Specifically, we are trialling a scaled-up version of this experiment by deploying spat-filled seaweed onto some of our restored reefs as well as adjacent rocky areas. If this method is successful, then it could help us understand more about recruitment dynamics in the restored mussel reefs and how to facilitate recruitment in the future.

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The four experimental treatment groups we trialed (clockwise from top left): Adult mussels and spat-filled seaweed, adult mussels without seaweed, no adult mussels and no seaweed, and spat-filled seaweed without adult mussels.



The results of the small-scale tray experiments for each of our four treatment groups. Mean recruitment includes both blue and green mussels. The letters show significantly different groups depending on the treatment.