

Marine Farming Association - March Monthly Update - for Industry Advisory Group

Excellent Initial Mussel Survival

From the data collected in February we estimated that our transplanted mussels had consistently very high initial survival, regardless of the site they were deployed in (Figure 1). The results suggest that the mussel translocating methods worked great, with much better initial mussel survival than recorded for other restoration that has occurred in the Hauraki Gulf.

Estimated Percent of Mussels Alive 1-month Post Deployment					
	Maori Bay	Skiddaw	Te Mara	Grant Bay	Weka Point
T1	100.0%	100.0%	99.3%	100.0%	100.0%
T2	100.0%	98.7%	100.0%	99.1%	98.9%
T3	100.0%	99.4%	99.2%	97.4%	100.0%

Figure 1: Table showing the estimated survival of each treatment plot at each site.

Managing Starfish Threat

The 11-arm starfish are voracious predators that are a threat to the newly restored mussel beds (Figure 2), but we can protect the mussels by removing the starfish (Figure 3). Continuing reinvasion of the beds by the starfish seems to occur, so we will measure and remove the starfish at every sampling interval. This will help us understand predation patterns and look at the affect they may have on mussel survival.



Figure 2: A photo of the 11-arm starfish predation on a treatment plot of restored mussels at Maori Bay.

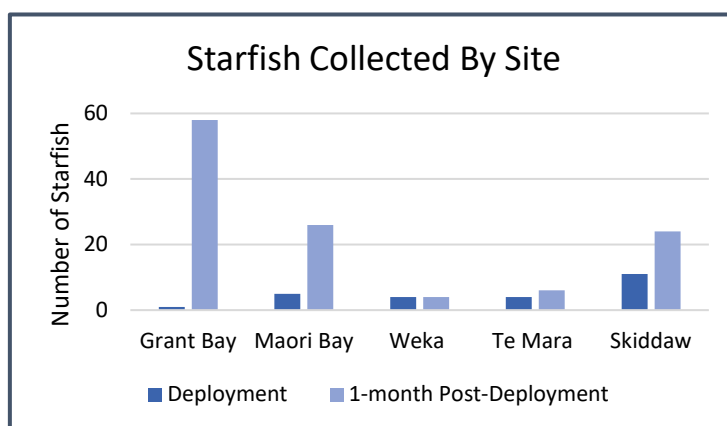


Figure 3: A graph showing the numbers of 11-arm starfish collected per site.

Understanding Movement

One interesting aspect of our study is to understand how the newly restored mussels move post-deployment. So far, we found that the transplanted mussels stay put and organise themselves into a coherent mussel bed all by themselves, allowing us to measure their spread (Figure 4). We are also interested to understand how different sediment types will affect this behaviour (Figure 5).

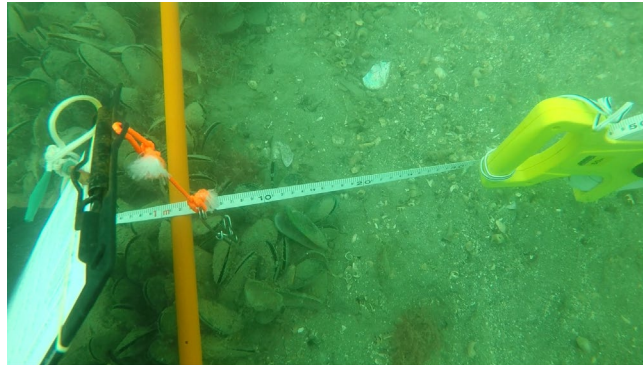


Figure 4: A photo showing the measurements that were taken of the mussel bed spread from the margins of each treatment plot.

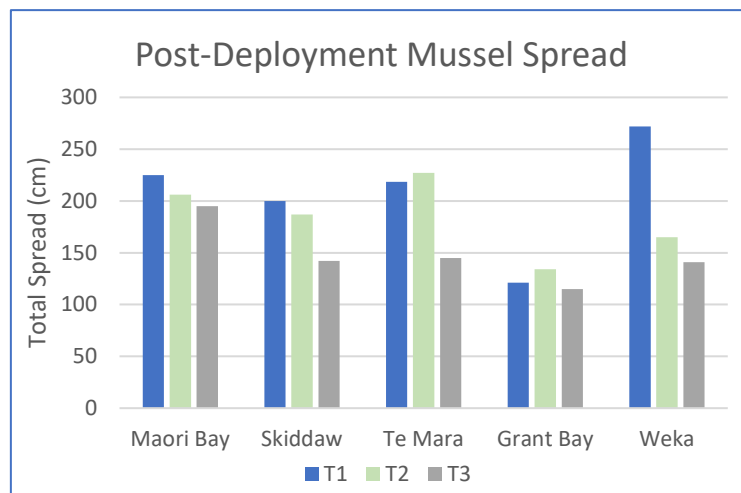


Figure 5: A graph showing the amount of mussel spread 1-month after deployment at each treatment plot per site.

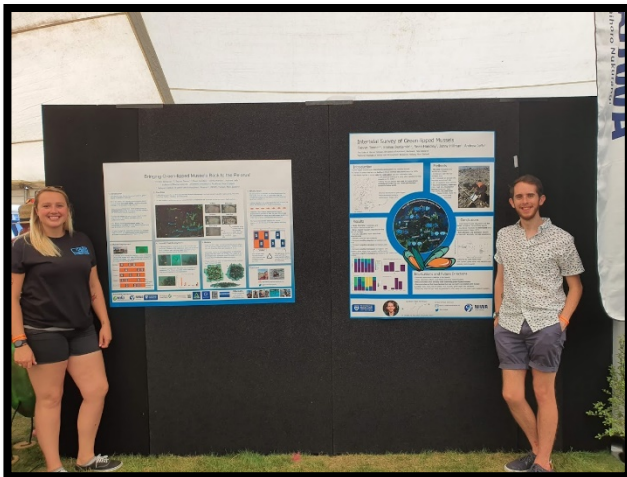
Havelock Mussel Festival

This past month was the Havelock Mussel Festival. It was a great way to spread the word about our project as there was a large amount of public interest and positive feedback on the project. Below is a photo of the event and the poster that I presented there.

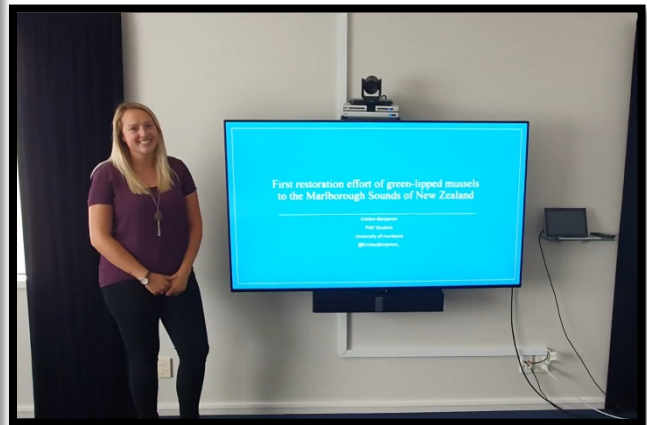
Unfortunately, in this current climate I am not sure when the next time we will check on the mussels, but my aim is for the end of April once we are hopefully all in the clear! I hope you guys all stay safe and as always, if you have any comments or feedback on this month's progress, please feel free to reach out via email at egol669@aucklanduni.ac.nz or follow the project on my twitter @EmileeBenjamin_.

Thank you for all your help and your time with this project. 😊 Emilee Benjamin

Photos from March 2020



Emilee and Trevyn presenting their posters at the Havelock Mussel Festival.



Emilee presenting her work online for the Shellfish Restoration Conference.

Bringing Green-lipped Mussels Back to the Pelorus!

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1. Introduction

- The Marlborough Sounds have been home to **green-lipped mussels** for centuries.
- Since the 1970's the naturally occurring green-lipped mussels **have seen great losses**, causing a dramatic change in the ecosystem of the Sounds.
- Restored mussel beds have shown great promise for **increased biodiversity** and **improved water clarity** to the ecosystems they are restored in.
- A project to **restore** the natural green-lipped mussel populations to the Pelorus has begun and is a collaborative effort!
- The **Marine Farming Association, NIWA, The University of Auckland and The Nature Conservancy** are all collaborators on this project.
- In order to **start the restoration process** our first step was to perform an **experimental mussel deployment** at 5 sites throughout the inner Pelorus Sound.

2. Five Sites

- 5 sites were chosen for our **first experimental mussel deployment**: we have named these after nearby areas, Maori Bay, Grant Bay, Te Mara, Skiddaw, and Weka Point.
- At each location a preliminary survey was performed to characterize the substrate and the community that lives there.

Te Mara

Skiddaw

Weka Point

Maori Bay

Grant Bay

Grant Bay is our rockiest site with the clearest water, but has the most sea stars!
Weka Point is our muddiest site.

6. What's Next?

- We will continue to **monitor our first deployment for two years**. This will help us understand how the mussels will respond to the different environments they have been restored in.
- Another objective is to **understand how the mussels will affect the biodiversity** in those environments.
- A second, much larger, experimental mussel deployment is planned for later this year. We will **test the advantages for using recycled mussel shell** when restoring mussels to soft-sediment environments.
- We have proposed **two sites** for this second deployment, the Kenepuru Sound Entrance and Fairy Bay.

3. Mussel Deployment

- In January 2020, Aroma Ltd. deployed a total of **4 tonnes of mussels** across all 5 sites. NIWA divers released the mussels into three, 3 m² plots at each site according to the experimental design below.

Site	Plot 1	Plot 2	Plot 3
Maori Bay	W	W	W
Grant Bay	W	W	W
Te Mara	W	W	W
Skiddaw	W	W	W
Weka Point	W	W	W

The boxes without mussels are controls.

4. 1-month Post-Deployment

- In February 2020, a 1-month check on the mussels was performed. **Photos of the plots** were taken with a camera via SCUBA and each plot was **video recorded** using a Remotely Operated Vehicle (Boxfish ROV).

- A subset of mussels from each plot was **counted and measured**. The **11-mm sea stars** were collected in and around the plots to look at predation.

Sea Stars Collected by Site

Site	Sea Stars Collected
Grant Bay (Maori Bay)	10
Maori Bay	5
Te Mara	10
Skiddaw	10
Weka Point	10

5. Models

- Using the ROV video recordings and the pictures taken from the camera, these recreations of a **treatment plot** from our Grant Bay Site were created (A, B, C).
- The model marked A is a **composition of individual photos** that were taken via SCUBA. The models B & C are images taken from the same 3D model and were created from the **Boxfish** video recordings.
- These models can help us understand how the mussels beds change over time.

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Reach out!

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Acknowledgements

Emilee's poster for the Havelock Mussel Festival.