



2021/2022 Annual Impact Report

12 months to June 2022

Kohikohi ngā kākano whakaritea te pārekereke kia puāwai ngā hua
Gather the seeds, prepare the seedbed carefully and you will be gifted with abundance

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Introduction



The inner Hauraki Gulf was once carpeted with dense beds of kūtai / green-lipped mussels - over 600km² across the Firth of Thames, Tāmaki Strait and the Waitematā. Sadly, these important biogenic habitats were dredge-fished to collapse in the first half of the 20th Century. **Our mission is to re-mussel the Gulf.**



“Nobody thinks ‘re-musseling’ the Hauraki Gulf is a bad idea... 84% of people support restoration of shellfish beds and reefs”.

Welcome // Nau mai

Kia ora,

Welcome to our 2021/2022 Impact Report.

In recent research conducted by the Hauraki Gulf Forum 81% of people said the Hauraki Gulf / Tīkapa Moana / Te Moananu-ā-Toi was important to them and 84% of people supported restoration of shellfish beds and reefs.

With all that support our challenge lies elsewhere: in the ‘how’. The sub-tidal, soft-sediment kūtai / mussel reefs which were once a dominant ecosystem for the inner Hauraki Gulf are now functionally extinct. We wish re-establishing them was as simple as planting trees, but alas it’s not. So, as you’ll hear from research lead **Dr. Jenny Hilman**, our focus is on research and discovery. We are out to weave the fabric of science and mātauranga needed to understand how we can achieve restoration at scale. I’m pleased to say it feels like we’re making progress. I hope after reading this impact report you’ll agree.

Our thanks go to all the funders, supporters and industry partners who have contributed to this work. We can all share a sense of satisfaction on the progress made over the past 12 months.

We marked the first ever Matariki public holiday on the 24th of June with a whakatō kūtai (mussel planting) south of Te Kawau Tūmārō-o-Toi (Kawau Island) with Ngāti Manuhiri. **Peter van Kampen** will have more to say about the project. It was a day of tangata whenua and tangata tīriti working side-by-side, building a healthier, more vibrant moana for the benefit of all of us who live around and love the Hauraki Gulf.

Mauri ora!

- **Peter Miles**

Kaihautū / Programme Director / Volunteer

The Mussel Reef Restoration Trust



2021/2022 achievements

110 tonnes of kūtai deployed across two sites and 9 test beds (around 10 million individuals), 3 wānanga held, 7 research papers published, 10+ community presentations to interest groups...

Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul

Ngāti Pāoa wānanga at Pirihahi Marae

Ngāti Whātua Ōrākei kūtai wānanga

60 tonne deployment at Ōkahu Bay

Revive Our Gulf "one square km" summit hui/wānanga

Influence of restored mussel reefs on denitrification in marine sediments (J Hillman et al).
Environmental predictors of sediment denitrification rates within restored green-lipped mussel beds (M Sea et al).

Considering the use of subadult and juvenile mussels for mussel reef restoration (A Alder et al)

100 tonne deployment south of Te Kawau Tūmārō o Toi (Kawau Island)
Ngāi Tai ki Tāmaki kūtai restoration wānanga at Umupia Marae

Mountains to Sea Wānanga at Harataunga Marae

The Importance of Stock selection for improving transplantation efficiency (A Alder et al)

The influence of mussel restoration on coastal carbon cycling (M Sea et al)
Expansion of shellfish aquaculture has no impact on settlement rates (T Toone et al)

Presentation to Restoring Takarunga Hauraki

Presentation to Forest & Bird North Shore

Presentation to U3A Browns Bay

Auckland Foundation *Hauraki Gulf Regeneration Fund* launch at the OBC
Presentation to Forest & Bird Warkworth

Presentation to Rotary Club, Parnell

Presentation to Devonport Yacht Club

Presentation to Restore Hibiscus & Bays

Update to OBC members (with HGF, The Noises Trust)
Ōrākei Local Board Environmental Forum
Hutchwilco Boat Show with Auckland Foundation

■ RESTORATION PROJECT ACTIVITIES ■ RESEARCH PUBLICATIONS/MILESTONES ■ ADVOCACY & COMMUNITY OUTREACH



Restoration projects & tangata whenua partnerships

“...this isn't a journey that will likely be realized in my lifetime - but I'm not doing this for me, I'm doing this for Tangaroa and my mokopuna”



Tēna koutou katoa,

Tika tāu kōrero, aē, kaua rānei. Kāore he me whakamātau. Yes or no, there is no such thing as try, **just do**. This whakatauaikī captures our ethos. It speaks of giving our all in everything we do, not just giving it a try.

The last 12 months of mahi has seen the volume of mussels deployed for restoration in the Gulf doubled. The intention is to further add to these sites, and add more sites, working alongside our tangata whenua partners. This significant ramp-up speaks to our progress in two areas: establishing trust with our tangata whenua partners and breaking down barriers in compliance.

Our tangata whenua partners are phenomenally busy, with a multitude of demands on their time and resources. We acknowledge their massive contribution in our partnerships and in making this work happen. Moving at 'the speed of trust', working together, we have managed to overcome significant barriers to progress to getting mussels in the water. We have managed to streamline the consenting and biosecurity processes as well as achieve deployments during a global pandemic. We work together and **Just do**.

The Ōkahu Bay project continues the legacy of early work on kūtai re-seeding conducted by Ngāti Whātua Ōrākei (Richelle Kahui-O'Connell & Tamaiti Tamaariki 2014). We acknowledged their leadership and vision, and desire to improve the mauri of the Bay, as we made sizable deployments there at the end of 2021 - a complex project that took 2 years to achieve! No matter what, **Just do**.

Te Au o Morunga is our project alongside Ngāti Manuhiri Settlement Trust. The words of Chief Executive Nicola MacDonald still resonate in my head: "Peter, we want this to be the biggest yet!". Thinking about it at the time, I thought 100 tonnes of kūtai would achieve that. The world works in mysterious ways! A series of texts unfolded - the first indicating that Ngāti Manuhiri would like to celebrate Matariki with a deployment - whakatō kūtai, the next was from a mussel farmer saying that 150 tonnes of mussel was available but needed to be deployed before September. In contrast to Ōkahu Bay, a mere six weeks out from the Matariki public holiday, and with no surveying, workplan or permits in place, a collective push and astonishing turn-around from Auckland Council and Biosecurity NZ saw everything come together - Mussels in the water for Matariki! No matter how impossible the task seems, **Just do**.

As we chart our pathway forward, this isn't a journey that will likely be realized in my lifetime - but I'm not doing this for me, I'm doing this for Tangaroa and my mokopuna. With this in mind, we **Just do**.

Ngā manaakitanga,

- Peter van Kampen

Kairuruku Whakahaumanu Kaimoana / Shellfish Restoration Coordinator
The Nature Conservancy NZ



Ōkahu Bay with Ngāti Whātua Ōrākei

“... It’s our duty to honour all those who have put in all those years for this... and for those who lay in our urupā, it’s our duty. My heart is warmed that my mokopuna will see our example....”

- Mervyn Kerehoma, Project Lead, Ngāti Whātua Ōrākei



“Seeing bums in the air and hands in the sand collecting kaimoana - that would be a beautiful health indicator...”

- Moana Tamaariki-Pohe MNZM, Ngāti Whātua Ōrākei



Looking out across the Waitematā towards Rangitoto, there was once a carpet of kūtai forming extensive reefs in the Rangitoto channel. Ngāti Whātua Ōrākei are mana whenua and kaitiaki of this area and the Toi Taiao team have been working to improve the state of the environment across Pourewa and the Whenua Rangatira area which includes Ōkahu Bay.

The Revive Our Gulf project has been working with the hapū to build large experimental kūtai beds in Ōkahu Bay. 60 tonnes of kūtai were placed into six 10 tonne mussel beds, three on a shell substrate and three on bare sediment. Work on kūtai regeneration has been multigenerational and follows an ecological vision laid down over 10-years ago by the late Richelle Kahui-McConnell.

For the wider project, Ōkahu Bay is a test, at scale, of kūtai survival and recruitment on shell vs. sediment. It is an important step towards us understanding how to restore reefs at scale. Ōkahu Bay is a challenging environment and recent monitoring, at 7-months post deployment, showed a trend of declining mussel bed density - with decline worse on mud than on shell. We are seeing more life in and around the beds, including 11-arm starfish, sponges and triplefins. As expected, we are also seeing some unwanted organisms like Mediterranean fan worm.

We anticipate needing to maintain Ōkahu Bay with additional mussel deployments in the coming year or two.



Photos: Ngāti Whātua Ōrākei whānau greet the kūtai as manuhiri; Workers from NIML wave after another successful deployment; Mussels 24hrs after deployment; Dr. Carina Sim-Smith and Sophie Roberts prepare for the 3-month monitoring exercise.

Te Au o Morunga with Ngāti Manuhiri

As kaitiaki, Ngāti Manuhiri demonstrate their commitment to te taiao through advocacy and action. They are working with Auckland Council and the local community to reduce sedimentation via the Mahurangi East Land Restoration Project. On Waitangi Day 2022 they placed a rāhui on their rohe moana for tipa/scallop.

Ngāti Manuhiri and Revive Our Gulf celebrated Aotearoa New Zealand's first ever Matariki public holiday by launching *Te Au o Morunga*, a project that aims to restore the mauri (life essence) of Te Moananui-ā-Toi through re-establishing kūtai / mussel beds in the iwi rohe moana. In a ceremonial deployment involving karanga, karakia and waiata, 400kg of kūtai were cast into the waters at a new restoration site by Ngāti Manuhiri whānau and Revive Our Gulf project participants.

“Te Au o Morunga refers to the thin shimmer you see out on the horizon on a calm day out on the moana”, explains Nicola MacDonald, Chief Executive of Ngāti Manuhiri Settlement Trust. The project title is metaphoric, “It is about progressing towards a brighter future for Te Moanui-ā-Toi and for ngā uri o Ngāti Manuhiri”.

A further 150 tonnes of kūtai will be deployed across two adjacent sites south of Te Kawau Tūmāro-o-Toi (Kawau Island) - the largest deployment of kūtai yet in the Hauraki Gulf.

This project looks to create a ‘joined up’ series of kūtai beds across the islands and bays around Te Kawau Tūmāro-o-Toi (Kawau Island) that will help us understand mussel survival, recruitment and predation under different conditions. The area has a special significance for marine conservation as it is home to Aotearoa’s first ever marine reserve at Te Hāwera-a-Maki (Goat Island).



Photos: A rainbow tohu (sign) marks the occasion of the Matariki whakatō kūtai / mussel drop; 400kg deployed by hand on Matariki; Ngāti Manuhiri vessels raft up; 50 tonnes deployed from NIML barge later in the same week.

“It’s about progressing towards a brighter future for Te Moananui-ā-Toi and for ngā uri o Ngāti Manuhiri”.

- Nicola MacDonald, Chief Executive, Ngāti Manuhiri Settlement Trust



A rangatahi perspective

He taura whiri kotahi mai anō te kopuna tai no I te pu au. *From the source to the mouth of the sea, all things are joined together as one.* This whakataukī reflects the essence of our whakapapa and connection to Tikapa Moana. Just as the seas are connected to the rivers and lakes, we are all connected as one. Tikapa Moana has sustained life for many generations within my whānau. Our waterways connect us to our ancestral history.

There is no rangatahi without the rangatira. Rangatiratanga is the continuum of the ever-evolving generations that are connected as one. As rangatahi, we are part of the whole and our voice reflects the teachings from our tupuna. This is why it is important to have a rangatahi voice. We not only carry the past knowledge from our tupuna, we hold the voice of the future. Involving rangatahi in this kaupapa allows us to extend our knowledge which we can then share with our whānau. It is essential for us as rangatahi to build our connection with te ao Māori.

We have grown up seeing the first-hand effects of climate change and human exploitation, and as rangatahi, we want to shift the narrative and create a better relationship with our taiao. The future of mussel reef restoration allows us to start giving back to our environment and ensuring sustainable use for future generations. Our aspiration is to regenerate and revitalise the mauri of Tikapa through mātauranga Māori.

Mairangi Bennett & Isabella Penrose
Ngāi Tai ki Tāmaki



“The future of mussel reef restoration allows us to start giving back to our environment and ensuring sustainable use for future generations.”



Photos: Mussel reef restoration wānanga at Umupia Marae; Out on Tikapa Moana with the Ngāi Tai ki Tāmaki whānau viewing potential sites for restoration work.

The Revive Our Gulf is working with Ngāi Tai ki Tāmaki to identify areas in their rohe moana that would make suitable mussel reef restoration sites for the future.

Working towards a winning restoration formula

“What motivates us all in this project is to make the ocean a better place...”

Kia ora,

The mussel deployments with tangata whenua have been a real highlight this year. Our shellfish research team now comprises 7 PhD students, 2 MSc students, 2 research assistants, 2 undergraduate Capstone students and a postdoctoral researcher working on shellfish restoration across the Hauraki Gulf and Marlborough Sounds. What motivates us all is to make the ocean a better place.

Over the last 12-months we continued to fill in some of the key knowledge gaps on the value of mussel reef restoration - the ‘why’. This has been challenging because sub-tidal, soft-sediment mussel reefs are functionally extinct in the Hauraki Gulf, so there are no healthy, local reference reefs to observe. We are building a better understanding of how biodiversity and biomass builds back as we restore. This is important as it helps us understand what success looks like.

In June 2022 we published our world-first research on how mussel beds help to remove harmful forms of nitrogen from the water - another ecosystem service benefit we can now attribute to this work.

Today we build mussel beds using *translocated* mussels from mussel farms. While there’s a lot we can do to optimise translocation, we know a winning long-term restoration formula will depend on our understanding of *recruitment* - how that next generation of mussels comes along and settles in the beds. You will see this work ramp up over the next year.

Mauri ora,

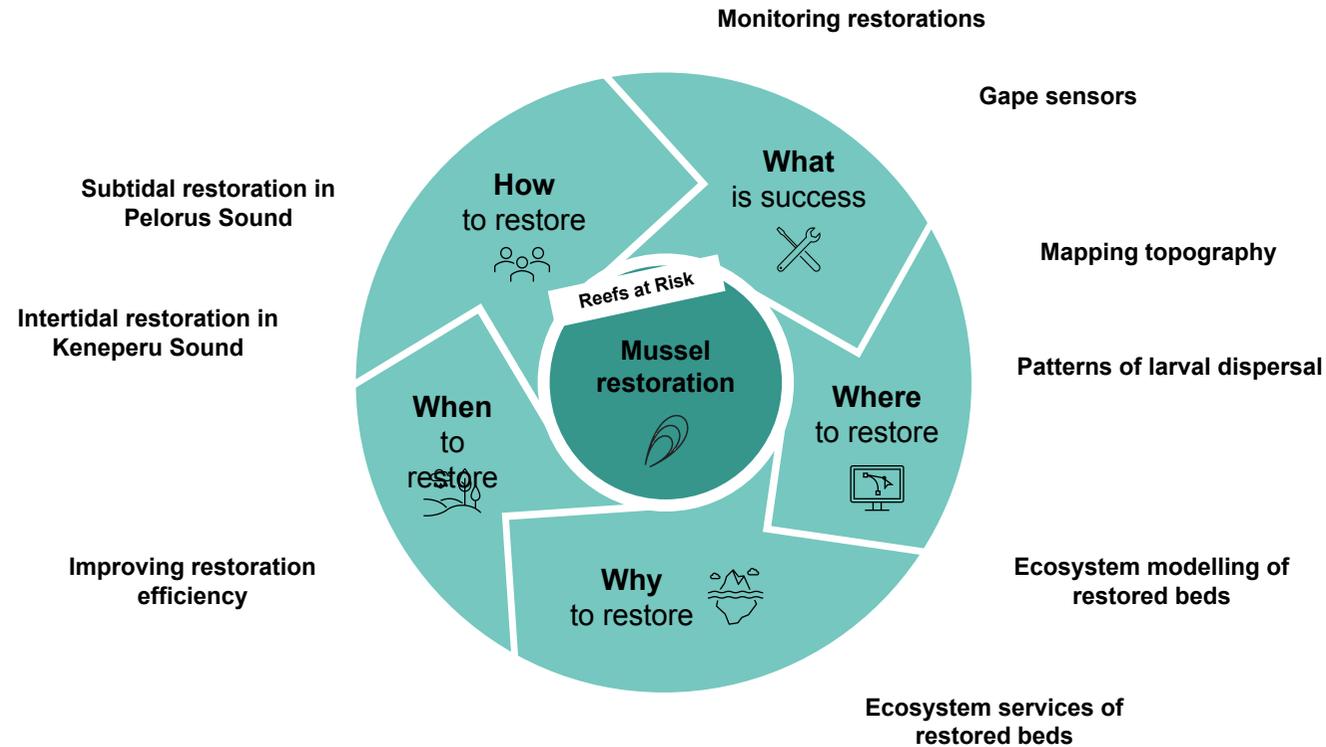
Dr. Jenny Hillman

Project Lead

University of Auckland Institute of Marine Science



Shellfish restoration research at the University of Auckland



The research at University of Auckland Institute of Marine Science is supported by:

- The George Mason Centre for the Natural Environment
- The Nature Conservancy Foundation North
- The McCrae Family Trust
- The Lou and Iris Fisher Charitable Trust
- The Marine Farming Association
- NIWA
- MPI
- The Chrisholm Whitney Trust
- The Mahurangi Protection Society
- The Newmarket Rotary Club

More info available at shellfishrestoration.wixsite.com/uoanz



What mussel reefs do

Te mahi a ngā ākau kūtai

FILTRATION

STRUCTURE

SUSTENANCE

CULTURAL

We're all about the mussels because it means more than mussels.

Sub-tidal soft-sediment mussel reefs were once a dominant marine habitat in the inner Hauraki Gulf. As 'ecosystem engineers' mussel reefs will enhance the mauri, life force or life sustaining capacity of the Hauraki Gulf. Bring them back and everything else follows.

7x
increased
biomass

Provide shelter for crabs, snails and a nursery habitat for juvenile fish.

A feeding ground for larger species like tāmure/snapper, wheke/octopus & whai/rays.

Remove suspended solids from the water column.

Stabilise the seafloor, reducing re-suspended sediment.

4x
increase in
invertebrate
densities

Remove toxins like heavy metals and excess nutrients from the water.

up to **25x**
Increased denitrification
rates

10x
greater fish
abundance

Bring back customary practices in kaimoana. Kohinga kai for manaakitanga / hospitality.

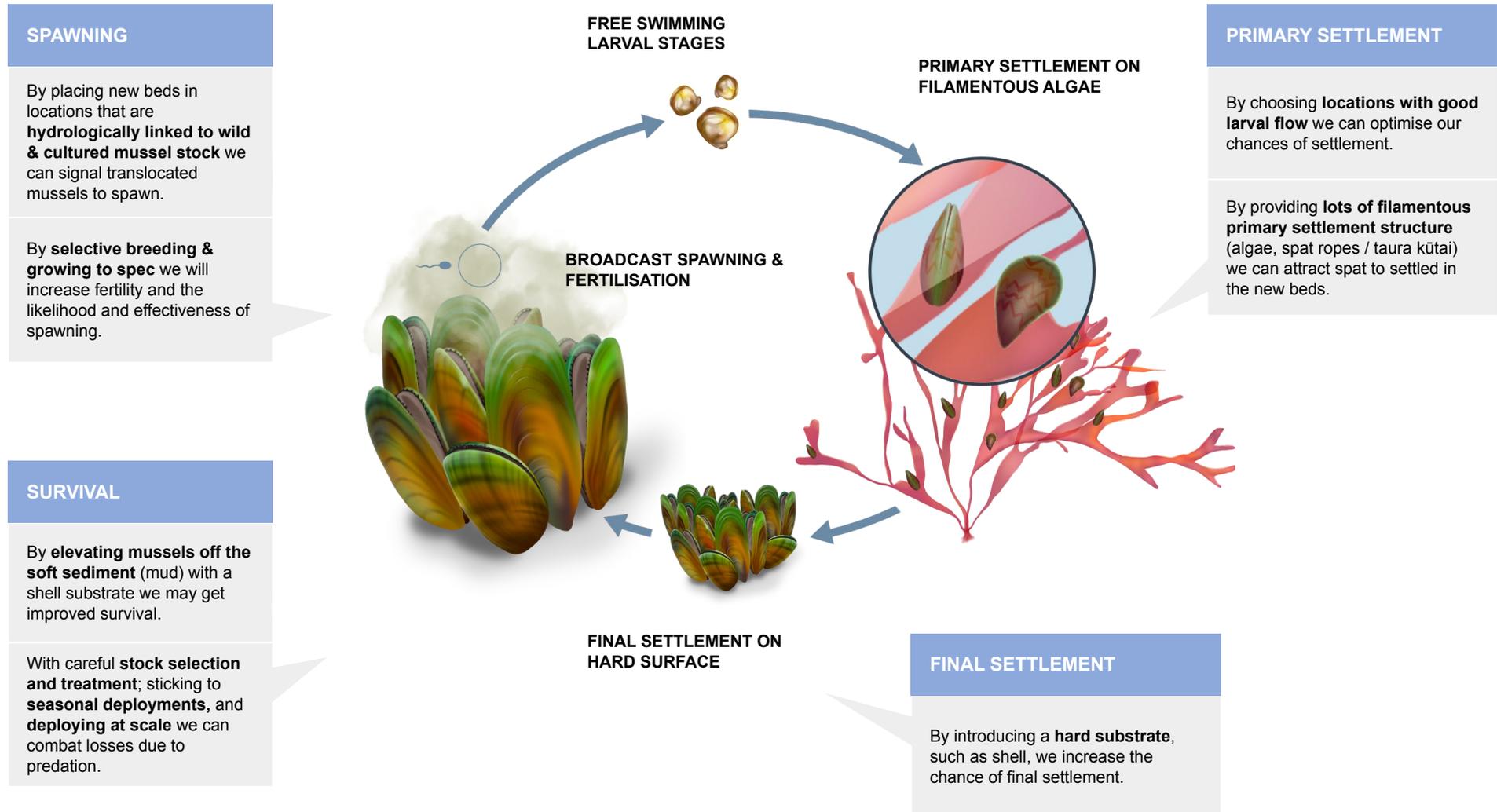
Promote recovery of seagrass & seaweeds as clearer water means more light.

Provide a hard surface for other organisms to grow on, including baby mussels.

Provide a source of food for seafloor animals (infauna) that feed on waste material from filter feeding.

How reef regeneration might work

It's been over 55 years since the Hauraki Gulf mussel fishery collapsed and there's been no sign of natural recovery. Damage due to the dredging, a loss of critical mass of mussels and changes due to sediment flowing into the Hauraki Gulf are the likely causes. Here's our working hypotheses of how regeneration might work.



2022 Annual Summit Wānanga

With Ōkahu Bay as a backdrop, this summit brought together the core project kaimahi, our tangata whenua partners and wider collaborators. The theme of the summit was **The first square kilometer // Te tuatahi manomita pūrua**. The objective was for us to think about what it might take to accomplish this milestone.

Held over two days, it was an opportunity to wānanga over both how we organise around the kaupapa as well as restoration approaches.

Attendees were from:

- Mussel Reef Restoration Trust (host)
- The Nature Conservancy NZ (host)
- University of Auckland (host)
- Ngāti Whātua Ōrākei
- Ngāi Tai ki Tāmaki
- Ngāti Manuhiri
- Ngāti Pāoa
- The Waiheke Marine Project
- The Noises Trust
- Kelly Tarlton's Marine Wildlife Trust
- Hauraki Gulf Forum
- Envirostrat
- Port of Auckland
- Sanford / North Island Mussels Limited
- Auckland Foundation
- Foundation North / Centre for Social Impact
- Auckland Council



“...but we are planting the seeds for future generations to continue”.

“These kōrero are centered around Māori concepts... This contributes to tino rangatiratanga”

“How our future generations view our actions is important”

“He mahi rangatira, he kaupapa nui!”

“..we need to establish strong foundations in order for them to continue the mahi”

ORGANISING AROUND THE KAUPAPA

Who benefits and how

The Revive Our Gulf project has many partners and stakeholders. We share a vision & mission that is ecological - we all want to see a vibrant and abundant Hauraki Gulf. Each group has specific and sometimes unique motivations that will sustain their involvement. The potential for this kaupapa to connect people to each other and the moana, provide opportunities and livelihoods means the social, cultural and economic drivers 'lead' the ecological ones. Ultimately, Revive Our Gulf will not only be about the role of kūtai/mussels in restoring abundance and biodiversity, but also how people including iwi, communities and other regeneration projects have engaged with each other to generate the results.



Creating space for mātauranga

We support the aspirations of tangata whenua involved in the Revive Our Gulf project to recover and further develop the mātauranga around shellfish restoration.

He awa whiria (a braided river) is an approach to managing different knowledge systems across different cultures and world views (Macfarlane, S., A. Macfarlane, and G. Gillon. 2015). It aims to bridge cultural perspectives by giving each knowledge base its own space and the mana / respect each deserves. For mātauranga this includes respecting tikanga, where knowledge comes from, and the value of cultural input. Observations, learnings and outputs can then be braided together over time.

In practice, because mātauranga is localised and place-based, mātauranga interests will be managed at a local project level. To be able to share there must be trust and respect. This is best built up over time, working arm-in-arm on a project, and by investing in relationships (whakawhanaungatanga).

The successful cross-pollination of ideas (the braiding) will require giving the time and space for this to happen. This means learning what the knowledge streams can contribute to each other and creating a high trust environment for this to occur. We want the people associated with both bodies of knowledge feeling like their work is making a meaningful contribution to this kaupapa. Ultimately, that will be the measure of our success in applying he awa whiria.

We want the people associated with both bodies of knowledge feeling like their work is making a meaningful contribution to this kaupapa.



Photos: Raranga / weaving harakeke and Mussock™ to hold juvenile mussels prior to deployment in Ōkahu Bay. PhD student Mallory Sea from the University of Auckland Institute of Marine Science uses syringes to take water samples from benthic chambers.

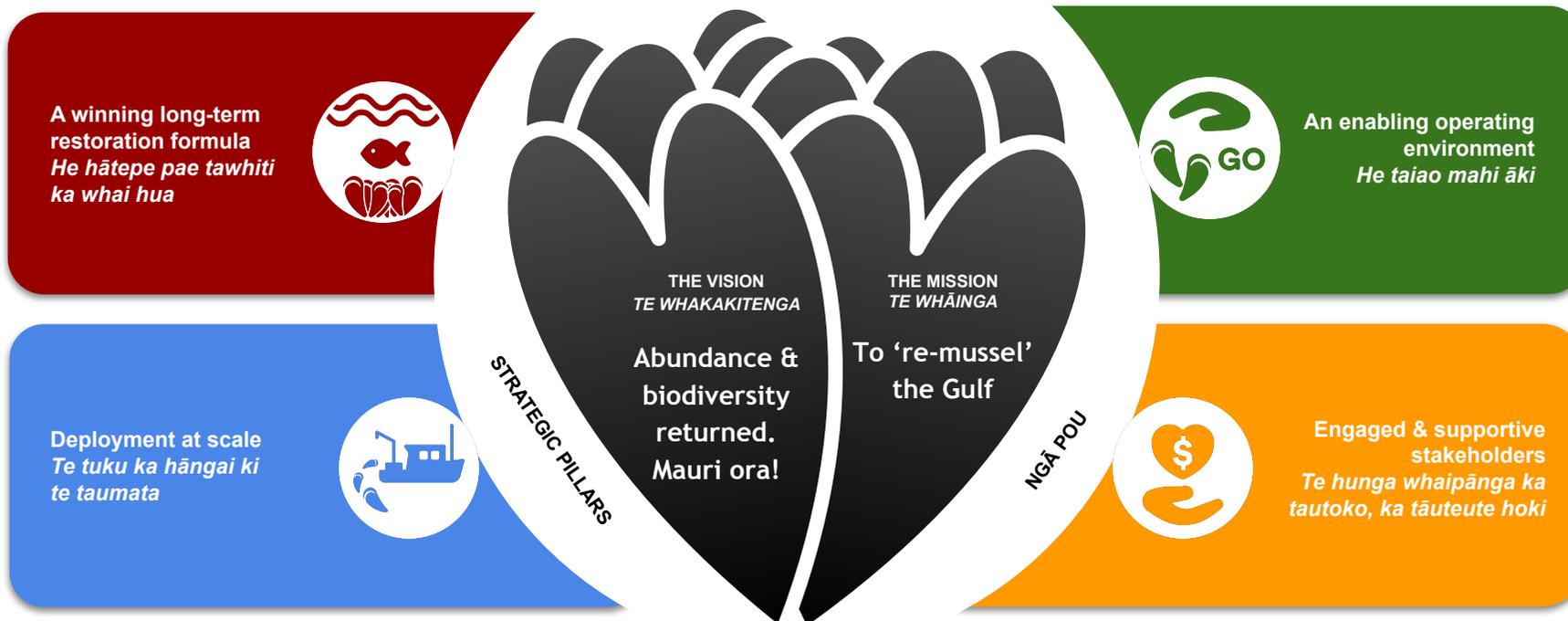
Our strategic framework // *Tō tatou mahere rautaki*

What abundance & biodiversity looks like

A Hauraki Gulf enhanced with restored mussel reefs, healthy ecosystems and a natural biodiversity of marine life // *He Tikapa Moana kua whakanikotia ki te papamoana ākau kuku kua whakarauoratia, ki te pūnaha hauropi, ki ngā kararehe moana rerenga rauropi.*

What 're-musseling' the Gulf involves

Working in partnership with iwi/hapu/whānau and community to restore the mussel reefs of The Hauraki Gulf // *Kia whakahaumanutia ngā ākau kūtai o Te Moana ki Tikapa/Te Moananui ā-Toi.*



ORGANISING AROUND THE KAUPAPA

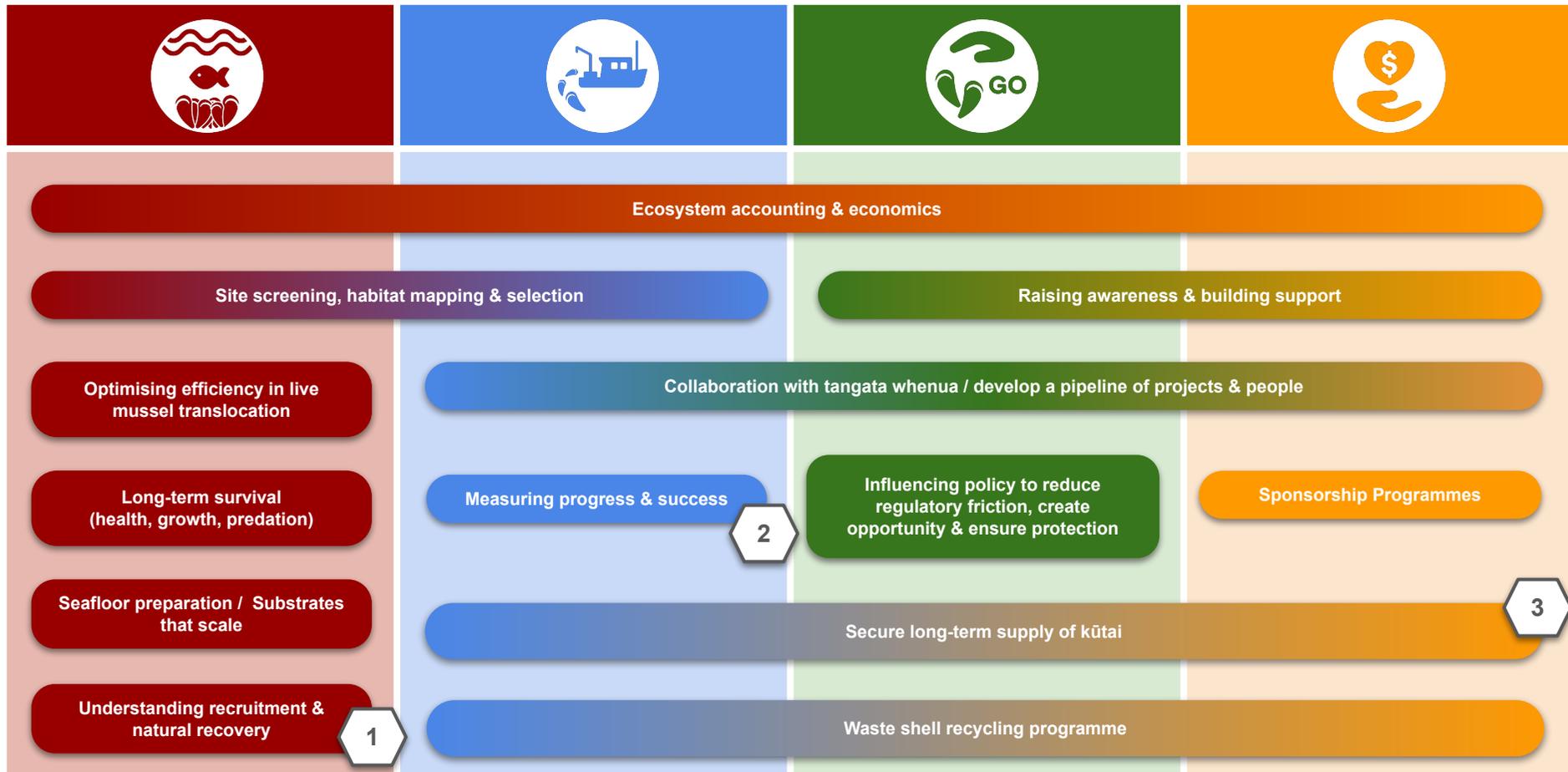
Strategic Priorities // Ngā whakaarotau

Restoring the kūtai / mussel reefs of Tīkapa Moana / Te Moananui-ā-Toi / The Hauraki Gulf is a long-term, potentially intergenerational project. Active habitat restoration of 10's or even 100's of square kilometres of reefs will require us to know how to create healthy, self-sustaining mussel beds.

Fundamental to this is understanding recruitment (1) - getting that next generation of mussels to settle in the restored beds is then a critical step. It will also help us understand how to trigger natural recovery - we need Tangaroa to play a major part in the recovery effort.

Over time, once a winning long-term restoration formula emerges, we can look to scale. Ensuring we have a robust, reliable and growing supply of mussels to meet our needs in creating new beds becomes important (3), and being able to scale our monitoring so we can measure progress across larger areas (2).

1-2-3 are our 'big rock' priorities. While we plan to make progress across the board, addressing the big rocks is critical to success.





A robust triplefin moves in 24 hours after the last kūtai/mussel deployment at Ōkahu Bay, November 2021. Photo: Shaun Lee

A massive thank you // Ngā mihi nui

CORE COLLABORATORS



TANGATA WHENUA



PRINCIPAL PARTNERS & FUNDERS



PROJECT SUPPORTERS & CORPORATE SPONSORS



Thanks to Shaun Lee for the illustration and most of the photography in this report.