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Glenn Edney - Ahu Moana | Oceanic Manta Rays | Trail Cameras in Conservation Marine Protection Bill | Motu Kaikōura

Aotea Great Barrier
ENVIRONMENTAL TRUST
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EDITORIAL: From Tataweka to Hikurangi, a Predator Free Roadie

KATE WATERHOUSE (Chair of AGBET)

There's a humid northwesterly and we are slogging up the newly gravelled track to Tataweka a few days after Christmas. I first walked this way aged eleven, pushing through head high kānuka regrowth over the mining road that had bulldozed along the spine of Te Paparahi. These days the grandson of that bulldozer driver is employed by Tū Mai Taonga and monitors cage traps and trail cameras trackside as part of the largest feral cat eradication ever attempted in Aotearoa New Zealand. I've served on its steering committee from the beginning and I'm inadvertently about to spend two weeks on a tour of three of the most important conservation efforts in Aotearoa New Zealand – Aotea's Tū Mai Taonga, Predator Free Wellington's Miramar Peninsula success and the 150,000 ha Raukūmara Pae Maunga project to restore the remote ranges of Tai Rāwhiti.

We leave the Barrier and head to a wedding in Wellington after New Year, staying in Miramar at the home of a Barrier Cooper whose father hunted goats in Te Paparahi. They have only praise for Predator Free Wellington who have eliminated rats, stoats and possums on the Miramar Peninsula. There's an explosion of tūī, and that has led to a much more exciting

The ridge track to Tataweka passes kohekohe and taraire forest (Credit: Kate Waterhouse)

Cover: Victor Greenfield in Ecklonia kelp forests at Schooner Bay (Credit: Glenn Edney)
Back cover: Broken Islands (Credit: Mead Norton)

resident – not one but two pairs of kārearea, or New Zealand falcons. Out walking on Signaller's Hill I hear them before I see them – a staccato kek-kek-kek high overhead. They wheel and circle above the bungalows and winding streets, until one abruptly dives at an astonishing speed. There are so many birds here now that falcons too can thrive. Earlier in December I'd seen a single falcon near the summit of Hirakimatā while completing the Aotea Bird Count. It's four years since a network of more than 200 A24 self-resetting traps were installed there. Monitoring shows rat densities are down and breeding birds look like they're are up—hence the kārearea.

Besides Tū Mai Taonga, there are only a handful of iwi led PF2050 projects underway. After the wedding we head over the Remutakas and north via East Cape, towards another one—the vast Raukūmara Pae Maunga project. It aims to halt the collapse of the forests of the Raukūmara ranges, led jointly by Ngāti Porou on the east side and Te Whānau-ā-Apanui on the northern side. Five times the area of the Barrier, these mountains stretch from the borders of Te Urewera to the East Cape, but are ravaged by deer, goats, possums, stoats and rats. Its birdlife and other species such as Hochstetter's frogs, skinks and lizards are shadows of past abundance.

Forest & Bird awarded Raukūmara Pae Maunga its top conservation award at its 100 Year celebrations in July 2023. Accepting the award the joint project lead spoke of a nine day hīkoi over the rugged traditional route across the ranges as a young person and of the kiwi and other birdlife she heard. The forest was almost silent when she repeated the journey 20 years later. Since then, these two iwi – previously foes rather than allies have, in partnership with DOC, secured

Alpine herb field Hikurangi maunga looking north towards Whanokau, 1618m on right, and Pott's Peak at rear (Credit: Kate Waterhouse)

long term funding to trap in and treat the Raukūmara with regular 1080 to stop the forest dying and restore its mauri.

Raukūmara Pae Maunga has become more important than ever after Cyclone Gabrielle attested, once again, that forested slopes are far less likely to slip during rain events than those in pasture or forestry. The evidence of this hits us squarely in the face as we set out on the tortuous route north from Napier. Steep farmed hills are pocked with thousands of creamy yellow scars and rivers gouged out by huge volumes of water and slash, taking roads, infrastructure, homes and sometimes people with them. Past Gisborne the slips are less numerous—but much bigger, as are the hills. We are heading for the greatest Raukūmara maunga, Hikurangi—at 1752m, the highest non-volcanic peak in the North Island.

We follow the widely braided bed of the Waiapu River, home of the great Māori leader and politician Sir Apirana Ngata. It is 130 kms in length and has the highest suspended sediment load of any river in the world— because of deforestation. Hikurangi hut is a solid 1000m climb through Ngāti Porou-run Tapuaeora station, and a graveyard of bleached podocarp trunks – rimu, matai, tōtara, all that remains of the forests on Hikurangi's northern flank. The hut sits on the 1250m contour at the forest edge, and all the peaks of the Raukūmara surround us. As we recover in the cool of the evening more and more birds begin to call – bellbirds, tomtits, two duelling long tailed cuckoo, chased off by whiteheads, all doing better thanks to the 1080. But at dusk the possums are quick to arrive and there's a group of about ten deer grazing the steep slope above us.

When the sun rises out of the sea the maunga are bathed in an orange glow. It is breathtaking, but it's two hours or more to the summit and this mountain makes its own weather. We climb through knarled beech festooned with lichen to a high terrace of tussock, spaniard and dozens of alpine plants. It's magical. But the deer damage is obvious in eroded patches and dead trees and I see stags descend a skyline ridge. As we sidle around the north flank of the peak the mists arrive and looking at the steep rocky gut to finish the climb we turn back. Maui's waka is said to rest in a tarn on Hikurangi's summit ridge and Ngāti Porou artists have erected magnificent carved pou below the hut. Groups can be guided here to watch the sunrise and the stars. We are grateful for the experience of this place and continued public access to their sacred maunga.

We pass through Te Araroa in time for burgers at the Kai Kart and spend the next few days absorbing the string of marae and remote communities, and the increasing bush cover that replaces the farmed chalky coast after Hicks bay. At Maraehako we camp and swim in the river and weka call up the valley. I wake at 5am to the pure tones of scores of bellbirds – not the deafening chorus I heard as a child at Waikaremoana, but loud enough for Rohan to think it's the alarm going off.

State Highway 35 is glorious here— there is a marae in every settlement in the space the mountains have left between their forested skirts and the sea. Past Te Kaha I see the first weka run across the road. At first I think it's a pheasant, but it has that unmistakeable weka shape. We cross the great bridge over the Motu river, flowing like a blue green beast from the heart of the Raukūmara to the Te Whānau-ā-Apanui rohe and the Bay of Plenty. Suddenly, another weka bolts in front of the car. Then, at the tiny village of Opape where the beaches open out and begin to stretch

Caution Weka (Credit: Kate Waterhouse)

Wood rose or pua o te reinga (Credit: Fanny Osborne Auckland Art Gallery collection)

towards Opotiki, there's a yellow and black road sign. It's just like the Pāteke signs on the Barrier, except it reads: Caution – Weka.

Weka were introduced to Rakitū by the NZ Forest Service, who thought they would disappear from the East Coast in the 1950s. But now they are a risk to seabirds, skinks, geckos and other species on a rat-free Rakitū. If agreement can be reached with the iwi of the rohe that those weka came from 70 years ago, then it seems the time has come for them to return there.

Dactylanthus, the wood rose, pua o te Reinga, flower of the underworld is still found in the Raukūmara, despite the flowers being delicious to possums and needing long tailed bats or pekapeka for pollination. Like the Long-tailed bat and Hochstetter's frog, the wood rose is expected to benefit from predator removal. IMAGE There were once dactylanthus on Aotea—Fanny Osborne painted them from her home above Mulberry Grove in the early 1900s. They are incredibly hard to spot unless flowering, but like the Raukawa gecko emerging on Rakitū, and the hundreds of lizards reappearing on the Broken Islands now that rodents are almost eliminated there, the wood rose may still be holding on somewhere in the forests of Aotea.

Ecosystems are so changed by the removal of vegetation and the birds, reptiles and insects that live in them. If forest clearance was the first environmental tragedy for our country, the mass colonisation of Aotearoa New Zealand by small mammals was the second.

Imagine the grief of tangata whenua as they watched the transformation of forests, wetlands, food sources, and their own lands and seas over the course of the last two hundred years. This is one of many reasons why tangata whenua leadership of conservation on Aotea over the last two years is a significant step forward for our natural environment. The pressure to succeed is considerable and is shared by Raukūmara Pae Maunga, but there are no short cuts to the end goal. I am enormously proud of the Tū Mai Taonga team and grateful to Ngāti Rehua Ngātiwai ki Aotea kaumatua and trustees for their leadership, mātauranga, patience and commitment to the kaupapa to restore Aotea.

Kate Waterhouse is Chair of the Aotea Great Barrier Environmental Trust, Deputy Chair of the Auckland Conservation Board and a member of the steering committee of Tū Mai Taonga. Kate's companions on this roadie were her husband Rohan and daughter Evie, pictured above.

The Ahu Moana Vision

Glenn Edney (Marine Ecologist and Trustee of Te Wairua O Te Moananui - Ocean Spirit)

The Ahu Moana Team at Schooner Bay. From left to right: Kathy Titore, John Bakunin, Victor Greenfield, Jessie Parker, Andy Saunders, Glenn Edney, Phil Ross, Shane Bowler, Keepa Wii, Gray Lewis and Jack Lewis (Credit: Glenn Edney)

Imagine the coastal ecosystems of Aotea in 10, 20, or even 100 years' time. What do you want them to look like? Do you want to see massive workups covering acres, kōura feelers waving above the low tide line, lush kelp forests, snapper spawning aggregations full of fat and healthy fish, schools of patrolling kingfish, and boulders full of big pāua. In other words, the stories of past generations brought to life. This is the aspirational vision of Ahu Moana. But what actually is Ahu Moana, beyond the vision? How will it function, and what contribution can it make to revitalising the mauri of Tikapa Moana – Moananui ā Toi the Hauraki Gulf?

In October 2022, following a year-long delay due to Covid 19, the first Ahu Moana pilot project was finally launched on Aotea. In a Q & A session in 2021, Local Board Chair, Izzy Fordham and Ngāti Rehua Ngātiwai Ki Aotea Trust Board Chairperson, Opo Ngawaka were asked their thoughts about Ahu Moana[1].

Izzy - Ahu Moana is a perfect concept for Aotea. It's a mechanism whereby mana whenua & the community work together in a formal partnership to co-manage our coastal areas. It gives a holistic aspect to protecting our moana and enabling species in decline to recover - a win-win for us all.

Opo - The Trust Board believes that an approach which embodies our tikanga principles is the correct way to address this issue. Ahu Moana is

a creative approach to protecting the moana. It supports mana whenua and community groups to create a strategy that reflects their beliefs, customs, environments, and realities to achieve an overall goal of marine restoration and protection.

What is Ahu Moana?

The Ahu Moana vision of community management of local marine ecosystems was developed as part of the Sea Change Tai Timu Tai Pari – Hauraki Gulf Marine Spatial Plan in 2017 and is one of the eight core elements of the Government's 2021 'Revitalise the Gulf' strategy[2]. The word Ahu as a verb means to tend to, foster or nurture and to move in a certain direction[3]. Ahu Moana therefore represents an active intent to restore the mauri of the moana, and to tend to the health of local fisheries and marine ecosystems. But Ahu Moana is also about working together, mana whenua and the wider local community, with the shared purpose of managing their local fisheries to ensure a healthy moana and access to abundant kai moana for generations to come. Just how communities can achieve this of course is another matter, and the primary objective of the pilot project.

Some of the key points that apply to Ahu Moana are:

- A co-management approach between mana whenua, local communities and local and central government.
- Ahu Moana are initiated at local level.
- Ahu Moana areas do not restrict access to the marine environment.
- Commercial and recreational fishing are allowed in Ahu Moana.
- Fishing and other activities may be restricted by mana whenua and local communities in Ahu Moana to protect fisheries or the environment.
- Ahu Moana are able to be integrated with existing (and future) fisheries and conservation instruments, such as marine reserves and marine protected areas, and mahinga mātaitai, taiāpure and rāhui within fisheries legislation.
- Ahu Moana do not affect the application of other statutory management tools to protect fisheries or the environment[4].

The two Government Agencies tasked with enacting the Revitalise the Gulf Strategy, including Ahu Moana, are MPI and DOC. MPI Ahu Moana liaison, Phil Ross, explains MPI's role in Ahu Moana and the pilot project.

"For MPI, Ahu Moana is built on four main pillars: people, place, knowledge and action. This concept brings together mana whenua and the local community and uses their combined knowledge and skills to deliver shared goals in their local fisheries and environments. For Ahu Moana initiatives to have enduring strength, they need to be formed independently of the Government and based on joint mana whenua and local community goals for the local area."

"Ahu Moana is unlike anything MPI have done before, so our intention is to learn from two pilot projects, of which Aotea Ahu Moana is one, before developing a framework to empower local-scale fisheries and environmental management throughout the Hauraki Gulf. I am incredibly impressed by the work being done by the Aotea Ahu Moana team. Their commitment to both monitoring and understanding

the coastal ecosystems of Aotea is something to be admired. My role is to be the conduit between central government and the local Ahu Moana teams, developing and understanding local aspirations for the moana, providing support when needed, and sharing information and advice on the regulatory tools that are available for local scale fisheries management."

The Pilot Project

The pilot project is a collaborative community-based action research project with the aim of developing Ahu Moana into a working model that can be shared with other communities throughout the Hauraki Gulf and beyond. It is being conducted under the auspices of Ngāti Rehua Ngātiwai ki Aotea Trust and the Aotea Great Barrier Local Board, with support and assistance from Phil Ross and myself. A steering group, which includes Trust representatives, local board members, kaumatua and the community monitoring team members is overseeing the initial phases of the pilot.

The first phase is primarily about proof of concept, which consists of trialling a community-based ecological monitoring method to evaluate the current state of ecological health, including important kai moana species, and sharing the results with the communities involved. This phase has been achieved successfully. The next step is to extend monitoring and ecological health assessments to other locations around the island and train monitoring teams. It's also about sharing the results so that we can have island-wide conversations about the current state of ecological health, including those kai moana species, and importantly, conversations about management options going forward. Feedback from those conversations will then inform the implementation of management actions.

Two locations were selected for the initial phase. Katherine Bay was chosen as it's of particular importance to Tangata whenua, whilst Schooner Bay was chosen as there was already a strong community interest in Ahu Moana. One of the purposes of the pilot project is to co-develop, place-appropriate monitoring and decision making processes that can inform sound management

Keepa Wii checking for kōura nests in Katherine Bay (Credit: Glenn Edney)

actions. The development of the monitoring process is one of my main roles in the Ahu Moana pilot and is also part of the current PhD research I am conducting through the Māori Studies Department at the University of Auckland. Community empowerment to monitor and manage their own moana space is something I'm passionate about and have been involved with for the past twelve years, here in Aotearoa, as well as in Vanuatu and the Temotu province in the Solomon Islands[5,6]. The Hauora Moana community-based ecological monitoring process being used in the pilot project has evolved out of those experiences[7].

Hauora Moana: Community-based Ecological Monitoring

The Hauora Moana monitoring method uses a qualitative approach to assessing the health of the survey site. Rather than running transects and counting specific species, this method uses a holistic and intuitive process to provide an overall assessment. Local knowledge and mātauranga Māori, as well as scientific ecological knowledge are utilised by the monitors to assess the current state of the site. Some aspects of this approach that help to provide an accurate assessment are the use of a variety of tohu (indicators), multiple monitors to help mitigate personal bias and shifting baseline syndrome, and a consensus process to ensure everyone's observations contribute to the final results. Observations include general health tohu, such as overall abundance and diversity of fish and invertebrate species, encrusting life and the variety and coverage of seaweeds, including the all-important ecklonia kelp forests. Important key indicator species, e.g., tāmure/snapper kōura/crayfish and pāua are also assessed, along with negative impact tohu, such as kina barrens, sedimentation and of course, exotic caulerpa. The comments below from Shane Bowler and Jack Lewis about their experiences with using this monitoring method sum up the feedback from the monitoring teams.

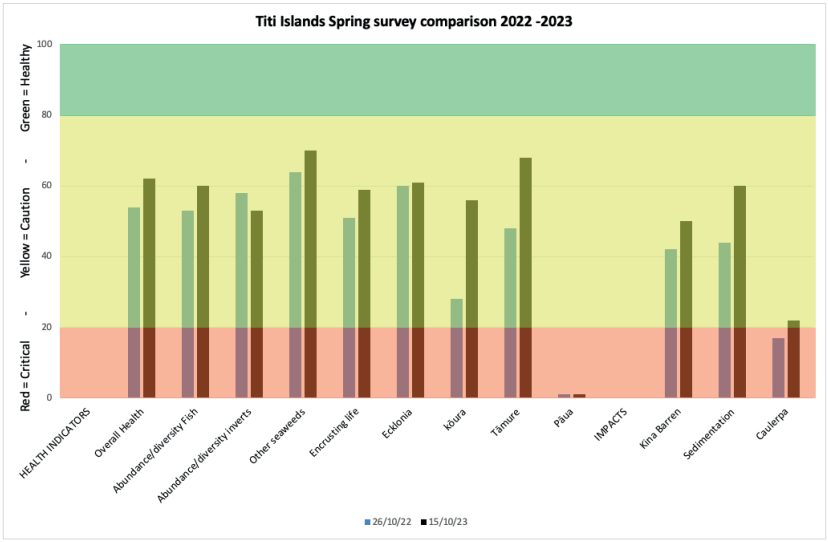
Shane - This has been a real eye opener for me. Before getting into this monitoring my diving was solely about finding kai moana. I hardly even noticed the other stuff, like the state of kelp and the encrusting life, or the amount of sediment. That stuff was just where you looked for the crays or the snapper. It was like I was seeing all this for the first time and it's really changed my outlook.

Jack - I really enjoy getting together with the others and learning more about how the ecology of the place works and fits together. This has opened my eyes to the moana as a living system.

The results are plotted onto an ecological health index scale, which gives an easy to understand, graphic view of the current state of the site (graph next page). Results in the green zone represent a good state of health, the yellow zone indicates an imbalance. Depending on where it sits on the scale, it may need further investigation and/or management action. The red zone points to a critical state that needs to be urgently addressed.

Progress So Far

A total of 15 survey dives have been conducted by the two monitoring teams in nine different locations. The results of these survey have provided the two communities with a good overview of the current state of



Ecological health index comparison between Spring 2022 and 2023 at Titi islands, Schooner Bay. As with the health tohu, the impact tohu should be interpreted in the same way. If they are in the red zone, it means they are in a critical state, the yellow zone, caution and the green zone means they are not an issue at the time of the survey

their respective bays. On several occasions the two monitoring teams have hosted each other in their respective bays, which has added hugely to the sense of partnership and shared purpose. In Schooner Bay this also includes seasonal surveys throughout the year. With a full year's worth of surveys in Schooner Bay the divers have been able to observe the natural seasonal fluctuations, which has helped develop their place-based ecological literacy. A good example of this is their deepened understanding of vulnerability of female kōura during the breeding season from June through September. As a result they have become strong advocates for seasonal closures during this critical time. A closed season is a good example of the kind of local management strategies that could be enacted through the Ahu Moana process. Other examples include: localised daily bag limits for specific species, maximum boat limits, exclusion zones or fishing technique rules. The important point is that it's the Aotea community that decide what they would like to see happening in their moana space.

The surveys in Schooner Bay have also given them the opportunity to experience first-hand the significant impact of exotic Caulerpa. The bay is within the Tryphena Rāhui and Controlled Area Notice (CAN), which prohibits anchoring, fishing of any kind and diving for kai moana, in effect a full no-take rāhui. Changes for any changes in abundance of particular species and well as the overall health of the bay. These changes can be seen quite clearly on the ecological health index scale below (graph above). These results show a general improvement in the overall health of Schooner Bay across almost all of the indicators, which

illustrates the value of rāhui (supported by the CAN) in giving ecosystems a chance to regenerate. The biggest improvement can be seen in the status of the kōura and tāmure, two most highly prized and harvested kai moana species, both commercially and recreationally. These upward trends are positive, but fragile. A single summer holiday season of "normal" fishing pressure would erase the recovery of the last two years of closure. Food for thought!

Glenn is an ocean ecologist, underwater naturalist, professional diver, sail, teacher and author. He has been exploring the ocean and interacting with ocean life for more than 40 years. He is focused on understanding the ocean as a living system. Glenn has a Masters degree from Schumacher College and Plymouth University, UK and is currently completing a PhD with the Department of Maori Studies at University of Auckland.

Acknowledgements

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Gray Lewis and Victor Greenfield among the Eklonia kelp forest at Schooner Bay (Credit: Glenn Edney)

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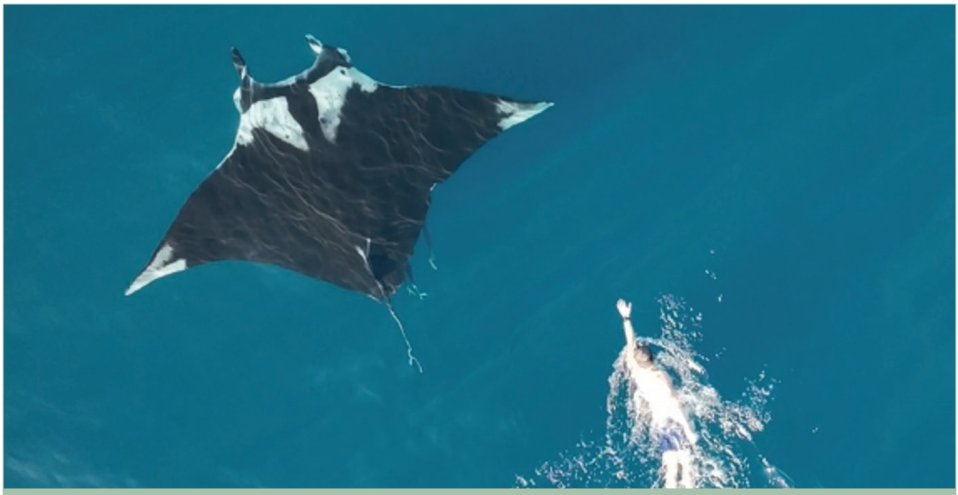
Why are Aotearoa's Te Wahi Rahi Oceanic Manta Rays in Big Trouble?

LYDIA GREEN (Founder and Project Director of Manta Watch Aotearoa New Zealand



Beyonce the manta and Swim for the Gulf's Jono Ridler (2023) (Credit: Lydia Green)

Giants of Their Kind

Te whai rahi, the oceanic manta ray is the largest ray in the world, reaching up to 7 metres across and weighing up to 2 tonnes. Manta rays and their cousins the devil rays (collectively known as mobulid rays), are essentially flat sharks and share some key attributes i.e., they both have rough skin instead of scales known as dermal denticles (that are actually tiny teeth) and a light, flexible skeleton made of cartilage as opposed to bone. Oceanic manta rays are considered to have one of the most conservative life histories of all shark and ray species, second only to the Greenland shark that can live for more than 500 years! This means that mantas are slow growing, long lived, late to reach sexual maturity and only give birth to one pup at a time, after an extensive gestation period of 12.5 months. Put that all together and you have yourself one vulnerable species, whose populations can't really handle any form of exploitation.

Historically, mobulid rays have evaded commercial fishing, but in recent decades a new market has established, and they are now heavily sought after for their gill plates for use in Asian Medicine. Gill plates are the cartilaginous structures that enable manta and devil rays to filter their much smaller zooplankton prey out of the water. A combination of clever marketing and pseudo-science have resulted in a sustained demand for dried manta gills plates.

As a result, 100,000 manta and devil rays are caught and/or retained as by-catch each year, which have devastated populations around the world. Moreover, it is suspected that oceanic manta rays have undergone a global

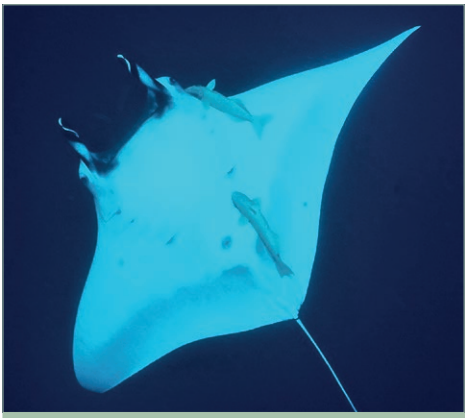
population reduction of 50–79% over the past 80 years. This was further emphasised in December 2020 when they were officially upgraded from Vulnerable to Endangered on the IUCN Red List of threatened species[1].

Aotearoa's Oceanic Manta Rays

Despite being fully protected in NZ waters since 2011 under the Wildlife Act, the biggest threat to Aotearoa's oceanic manta rays is the lack of data. We simply don't know enough about this lesser-known population to provide adequate protection or establish long-term conservation management. Currently, oceanic mantas have a NZ conservation status of 'Data Deficient', which will be eligible for reassessment in 2025. A key objective of the Manta Watch New Zealand (MWNZ) Charitable Trust is to get this domestic threat classification upgraded to 'Endangered', which in turn will give NZ mantas higher conservation priority and further acknowledge this species' worldwide decline. To inform change we need data and lots of it. We can then begin to answer the many questions surrounding this population. For starters, are oceanic manta rays native or annual visitors, how big is the population, what threats are they exposed to and how are manta using NZ waters? Are there important areas for feeding, breeding, and giving birth that require specific protections?

Cracking the Manta Code

It quite literally takes a nation and a handful of highly motivated manta enthusiasts (who also happen to be researchers), to tackle the many mysteries surrounding one of Aotearoa's most elusive species. When MWNZ began in late 2017, we had under 30 verified manta sightings spanning over 20 years and were met with the consensus



Top: Manta ray gill plates (Credit: Daniel Fanando). Bottom: Underwater with Aotearoa's Oceanic Manta (2022) (Credit: Mark Erdmann)

that this population was too hard to study[2,3]. Fast forward to November 2023, the start of our fourth research season and we have averaged over 200 verified sightings per year for the last 3 years. Our database currently sits at 886 verified sightings, and we've photographically identified (Photo ID'd) 136 manta rays, 20 of which we have also satellite tagged[4]. Initial results confirm that Aotearoa's mantas are world record holders, they dive deeper (1,374m), travel further (1,982 km in 52 days), and go into colder water (3.9°C), than any other manta population have been

Feeding Manta Ray (2021) (Credit: Edy Setyawan)

shown to do! Tag data has also confirmed that at least a proportion of the population migrate into the wider tropical Pacific between late summer and early autumn, heading towards Fiji and Tonga.

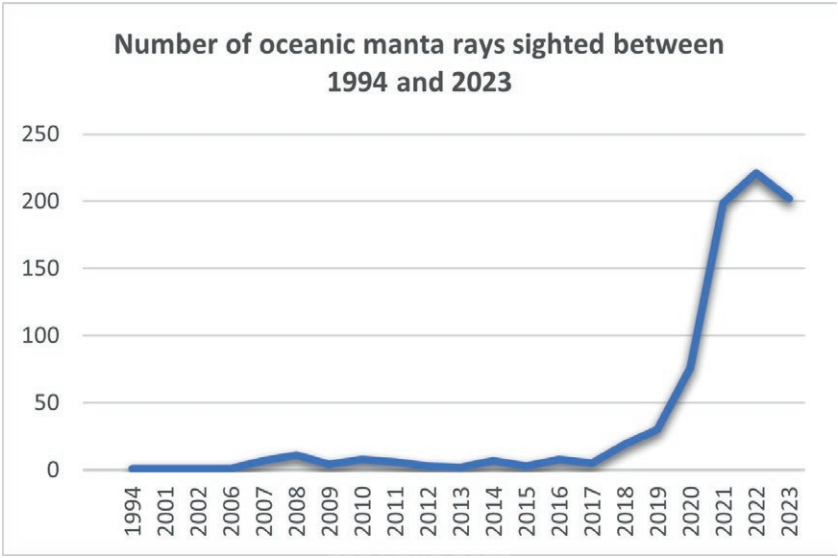
Aside from our primary research partners, Conservation International Aotearoa and the University of Auckland, citizen scientists are the project's foundation, and account for over 70% of the project's total sightings data. Establishing and maintaining relationships with Aotearoa's ocean users aka our manta network has enabled this small independent research project to have a significant national reach and impact.

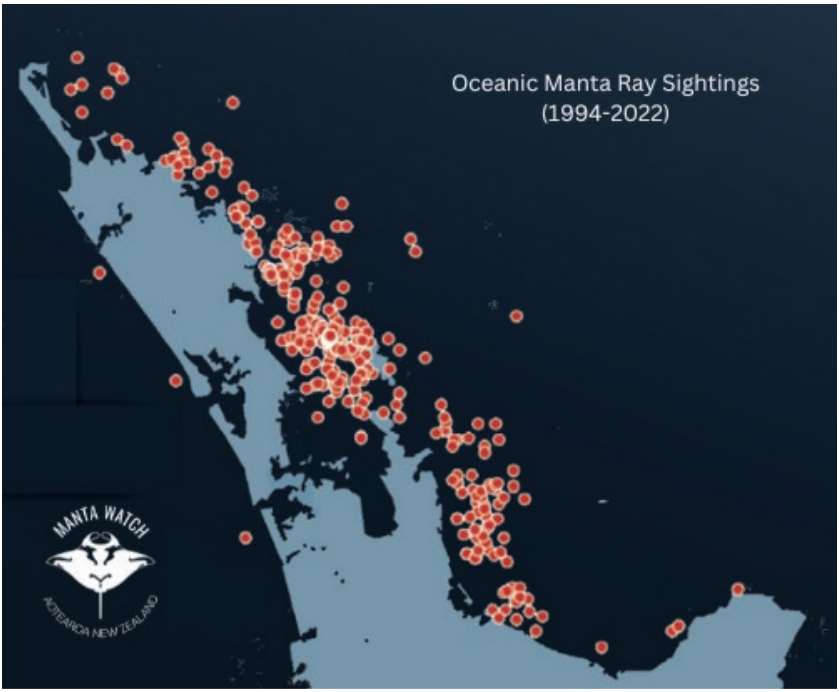
Tikapa Moana - Te Moananui-o-Toi

To date, we've conducted most of our research within the wider Hauraki Gulf. Originally this was purely out of convenience, as our research team are Auckland-Aotea based. However, as our understanding of this manta population grows, so does the significance of these waters to te whai rahi. It is of no surprise that the project's sightings data is heavily skewed in favour of the Hauraki Gulf, as this is where the majority of our survey effort occurs - i.e. more people out on the water, increases the likelihood of manta sightings. That said, we were keen to start challenging the bias to better understand how and why mantas are using the Gulf. For example, are the high number of sightings simply related to survey effort or are we getting more sightings in the Gulf because there are a lot more mantas here compared to other regions?

Masters student Rikako Orzaki was the first person to start tackling these questions[5]. Rikako produced a series of Species Distribution Models (SDMs) to determine areas of habitat suitability for manta on a national scale. She did this by running manta sightings and absence data with a whole host of environmental variables that are known to influence their distribution - i.e. sea surface temperate, seabed depth, distance from the coast etc. Interestingly, her results highlighted three key areas around the North Island of high habitat suitability for oceanic manta rays. The relatively shallow, highly productive waters of the Hauraki Gulf Tikapa Moana - Te Moananui-o-Toi were shown to be the most suitable habitat for manta on the east coast of the North Island, the Craddock and Jellicoe Channels either, side of Hauturu-o-Toi Little Barrier Island the most preferential[6]. Through her work, two additional areas on the North Island's west coast have also been identified as potential manta hotspots, which we're hoping to further investigate.

So, what are the key drivers influencing manta movements? Satellite telemetry is a great research tool to quickly visualise how mantas are using their habit, both horizontally and vertically. Furthermore, understanding a species' movement ecology helps us predict their responses to future environmental changes and human impacts. Our current Masters student Tamsin Cooper has been analysing the data from 6 satellite tags to progress our knowledge of fine scale manta



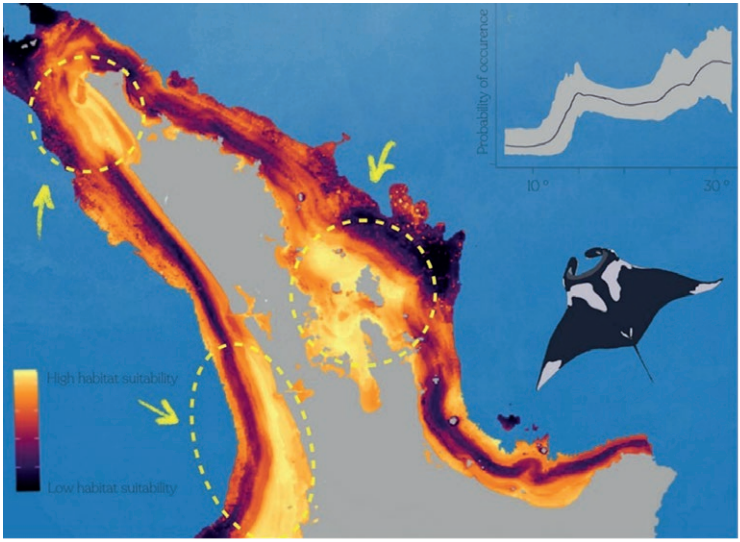


Top: Oceanic Manta Ray Sightings 1994-2023 (Created by: MWNZ). Bottom: Oceanic Manta Ray Sightings Map (Credit: Manta Watch Aotearoa New Zealand)

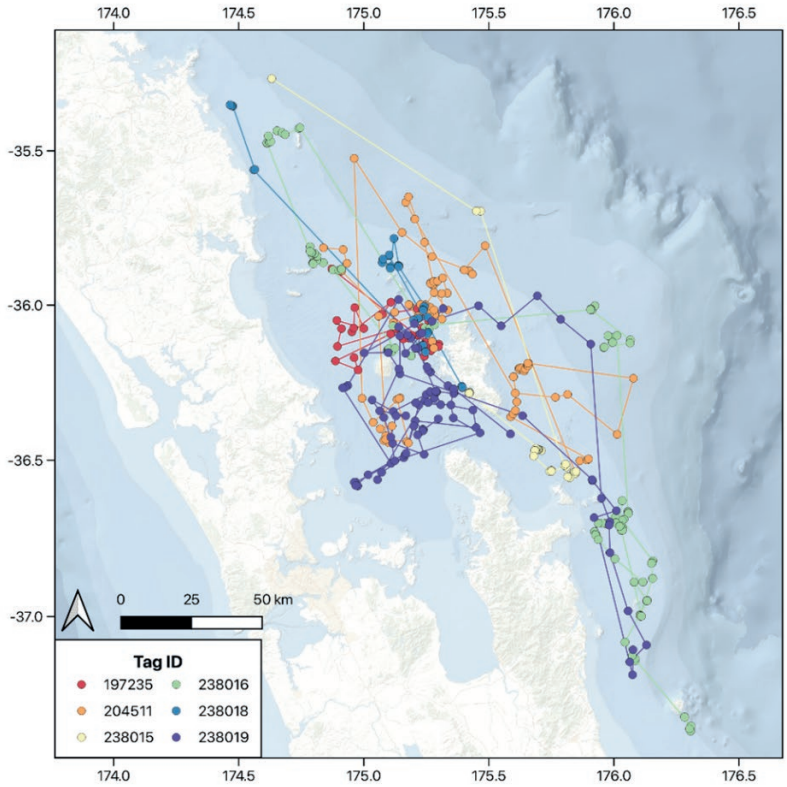
movements within the Hauraki Gulf Marine Park. Her results reinforce both our sightings and modelling data, showing extensive use, likely due to foraging behaviours throughout the inner and outer Hauraki Gulf. Tamsin's analysis also showed that most mantas spent their time in the top 5 metres, in water less than 200m deep, periodically diving down to the seafloor. Additionally, one tagged manta hit all our known manta hot spots, traveling up to the Hen and Chicks, on to the Poor Knights, before heading south to the Coromandel and the Bay of Plenty, nicely confirming regional connectivity.

How Can You Support Our Manta Mahi?

The more data we can collect, the quicker and easier it will be to inform change though long-term conservation management[7]. Which will enable greater protections for this globally endangered species, not only in Aotearoa but throughout its entire population range. None of the research findings above would have been possible without citizen science data. Initially, the project lacked verified sightings, the basic where and when. Now we know where mantas are likely to be (most of the time), so our next focus is to collect more data at an individual level. As, mentioned we have 886 verified sightings compared to only 136 photographically identified individuals, with only 3 of those manta rays having been re-sighted i.e. Photo ID'd a second time. We can identify manta rays by the unique spot patterns on their belly. Much like a human fingerprint, these markings remain unchanged throughout the manta ray's life and by cataloguing these images we can passively track an animal's life history overtime. Key insights into maturity, growth rates, and overall population size, can only be answered with high quality data collection at an individual level. Obtaining high quality images and videos are the most useful, with video being our preferred medium.



Species Distribution Model Using Sightings Data 1994-2021 (Credit: Rikako Orzak)



Satellite Track Date from 2021 & 2023 (Created and Analysed by: Tamsin Cooper)

We can learn so much about a manta ray in 10 seconds of footage (but the longer the better). Getting a good belly shoot is ideal, but if that isn't possible, make sure to get a good image of the manta ray's head. Through extensive drone work we have confirmed that the markings and colouration of the manta rays dorsal or top side are also unique, and can also be used to identify individuals, so just do the best you can.

The main take aways are please keep doing what you are doing but think quality over quantity. Get your cameras and/or Go Pros at the ready, stuck to the end of a pole does the trick! And if you are lucky enough to encounter a manta ray, you'll be prepared. Check out our **Manta Ray Data Collection Guide**[7] this nicely outlines all the information we need and the many ways you can submit your data to the project Jump onto our website: www.mantawatchnz.org to submit sightings directly and learn how else to get involved and support the project. When you're out on the water enjoying mantas and collecting lots of lovely data, we want to actively encourage that you do so safely and respectfully for all concerned. For interaction tips please see our **Best Practice Guide For Manta Encounters**[7]. Finally, please spread the word and tell people about the project, so that our collective understanding continues

MWNZ on survey 2023 (Credit: Edy Setyawan)

to grow, and we have more eyes on the water looking for te whai rahi.

Acknowledgements

Special thanks to Ngāti Manuhiri, Ngāti Rehua Ngātiwai ki Aotea, Ngāti Kuri and Ngati Te Rangi/Tuhua Kaitiaki for their support of this project. Massive thanks to our research partners, Dr Mark Erdmann and Dr Edy Setyawan of Conservation International Aotearoa for their invaluable contributions and enabling the project to grow from strength to strength. Big thanks to the University of Auckland and the wonderful Professor Rochelle Constantine and Dr Alice Della Penna for supporting our mahi and mentoring our Masters students, past and present. Speaking of which, big shout out to Rikako Orzaki and Tamsin Cooper for your commitment and hard work towards the project. Many thanks to our project supporters and funders, the Manta Trust, James Kline, Live Ocean Foundation, Pub Charity Ltd and the Lions Foundation. Finally huge, thanks to everyone that has ever let MWNZ jump on your boat to survey manta and to all of our wonderful citizen scientists, we'll look forward to hearing from you soon!

Follow us @mantawatchnewzealand

Note: Satellite Tagging research was conducted under DOC Wildlife Permit 96119-FAU and University of Auckland Animal Ethics AEC23490.

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Seeing Wildlife: How Trail Cameras Can Help Your Conservation Efforts

KIM BANNISTER (AGBET Trustee and member of the Oruawharo Medlands Ecovision Group)

Have you discovered the joy of the trail camera? There's never been a better time to dive in and really see what visitors you have in your back yard, be that small or large. Trail cameras are remarkably cheap fixed cameras which take still or moving images when triggered by detected movement. They use infrared lighting to capture monochrome images at night. The images are usually recorded on a memory card, resulting in the need to take the card out of the camera and transfer the images to a computer or phone. This sounds tedious but it's often intriguing and even thrilling! Some types use WiFi or mobile connections to make this easier.

Conservation work in Aotearoa is heavily dependent on the use of trail cameras to monitor wildlife. This article draws on the author's experience and aims to give some guidance on how and where they can be used, and to outline some of the remarkable technical innovations being trialled in Aotearoa, including the use of AI to process images captured with a thermal imaging camera.

Basic trail cameras using disposable batteries and memory card storage can be bought very cheaply from online stores such as Amazon. There is some luck involved since it's hard to predict from online reviews how well the camera will perform, for example on detecting movement or resisting the elements. However, the investment is small. Local retailers offer a range of models, including those from well regarded brands such as Browning, at a higher price point. WiFi enabled cameras allow you to preview and download images from your camera using a phone app, which may be more convenient but takes much longer than direct transfer from a card. Cameras with a mobile connection can notify you when the camera is triggered, just like a security camera. If you're in the market for a camera with a mobile network connection, you're best to buy from a local provider to ensure compatibility with NZ mobile networks. Battery consumption concerns many of us - most of the manufacturers advise against using rechargeable 1.2V batteries, although it is possible to buy 1.5V rechargeable lithium batteries which seem to work well (although they are expensive). Some cameras have inbuilt rechargeable batteries, or can be powered by a solar panel. International websites[1] can provide a wealth of information and reviews of different cameras.

Cameras use either SD or microSD memory cards. My experience with the latter is that they are more difficult to handle in or out of a camera in the field, and annoyingly easy to drop or lose in the mud or long grass. The cards are cheap these days, so it's worthwhile having twice as many as the number of cameras. This means you can swap in a new card when taking one out of the camera. Although images can be viewed on the tiny camera screen, it's really only practicable to take the memory card(s) back to base and load the images onto a computer. You might find hundreds of images and/or videos to review, most triggered by something you're not interested in. But as you flick through

Rats, pāteke and kāhu caught on a trail camera (Credit: Kim Bannister)

the pictures, just like panning for gold, you are eventually likely to find something of interest, whether it is friend or foe. Good housekeeping of your image library is needed to keep the pictures you want and discard the duds. The Miramar Peninsula predator control project reports that they reviewed 290,000 images collected from hundreds of cameras during 2021! The Perth River project team in South Westland has analysed over 2.5 million images from 142 trail cameras over 3 years. They have found that incidental images of bird species have enabled them to track bird numbers over the course of the project. Obviously this has involved an enormous amount of time maintaining cameras and collecting cards from very remote locations, not to mention the time on the computer analysing the images and cataloguing the data. Use of AI and thermal cameras is now vastly simplifying their work[2].

Where might a trail camera be useful? A camera or two near a trap or bait station will enhance your understanding of your quarry enormously. You may well be surprised and annoyed to find your target animal visiting but ignoring the trap filled with your most delicious and irresistible bait. Possibly even dancing gleefully on the top of your trap! Or, you might find a video of a pāteke family with 6 chicks in tow, far from the nearest waterway. Ten months later, presumably the same family shows up again at the same spot - grown up, but missing a few siblings. Our monitoring of the pig trap (an essential part of the exercise) has captured some stunning images of visiting kāhu, scooping up bits of rabbit. Perhaps (like me) you'll be horrified to see how many cats (including the neighbours') wander by. Pigs, pigs, and more pigs! Proof of the ineffectiveness of a five wire fence to contain a pig!

Your cameras can be strapped to a tree or a stake, or attached to an adjustable mount which can be screwed to a stake or screwed into a tree. Try to keep the camera as close as possible to the likely path of your quarry - although your camera may claim to detect

movement 30m away, you are far more likely to get good results (especially for small animals) if you are much closer than that, for example 5m or even less, and close to ground level. More than one camera at an important location is useful, because passive infrared (PIR) motion sensors are imperfect and cameras do not always trigger, or trigger too late - so an additional camera monitoring from a different angle will often increase your chance of capturing the vital data. You will soon learn the factors likely to cause false triggers, for example moving vegetation or sunlight patterns. These can be minimised by camera positioning - for example by pointing south to avoid sunlight on the sensor, and by removing moving vegetation near the camera. The PIR motion sensors detect changes in infrared radiation, hopefully caused by a warm-blooded animal. Obviously, reptiles won't show up! Presumably this explains why my resident chevron skinks have not yet been seen on camera.

Readers will be familiar with the Tū Mai Taonga (TMT) project on Aotea/Great Barrier Island, which aims to protect and restore native species and ecosystems through feral cat removal and intensified rat control, initially in the Aotea Conservation Park and Te Paparahi northern area. Trail cameras form an important part of this project, and 100 cameras have been deployed so far in some very remote parts of the island. The project team is working through the logistic issues associated with retrieving and processing SD cards, and minimising false triggers by adjusting camera settings and avoiding vegetation movement. Operations Manager, Chris Giblin, tells me that the team

Cats caught on a trail camera (Credit: Kim Bannister)

Pigs caught on a trail camera (Credit: Kim Bannister)

has found that rechargeable 1.2V batteries don't perform well and need to be swapped out much more frequently than disposable batteries. A good solution to this conundrum is yet to be found! The cameras are recording visits by cats, rats, birds, pigs… all data is recorded in their sophisticated purpose-built geographic information system (GIS) for future analysis.

The landscape scale projects such as TMT, Miramar Peninsula and Perth River Valley examples show how larger scale projects can quickly gobble up enormous amounts of operator time maintaining cameras and reviewing trail camera images. The Cacophony Project (with support from PredatorFree2050) has been developing technology using thermal imaging cameras which produce videos based on IR detection. Although these images are lower resolution than those from a conventional camera, they are more specific for warm-blooded animals. This makes it easier for AI algorithms to accurately identify particular animal species to vastly simplify identification and counting of target animals. Remote large-scale projects such as the Predator Free South Westland project are already leveraging this technology, using AI interpretation of thermal camera images to produce reports from unattended remote sites which are uploaded to base at intervals. Cacophony offer a thermal imaging camera system for sale at a price which is becoming more affordable, although it will be of less interest to individuals like you and me than it will be to organisations using large scale predator control techniques[3].

The next chapter in the AI/thermal camera story is the development of automated kill traps which only activate when a target species is clearly identified, and not when some other smart character (such as a kea) is snooping around. This also enables a more open trap design, increasing the chance of a shy creature venturing in. Although this approach is spookily similar to talk of military weapons using AI to autonomously target humans, it offers a real path forward in the Predator Free 2050 vision. Whether this approach will be helpful for the future of predator control on Aotea (in the absence of possums and mustelids) remains to be seen. However, in the meantime there's no reason why you shouldn't get yourself some conventional trailcams to better your understanding of what is happening in the natural world around you. Have fun!

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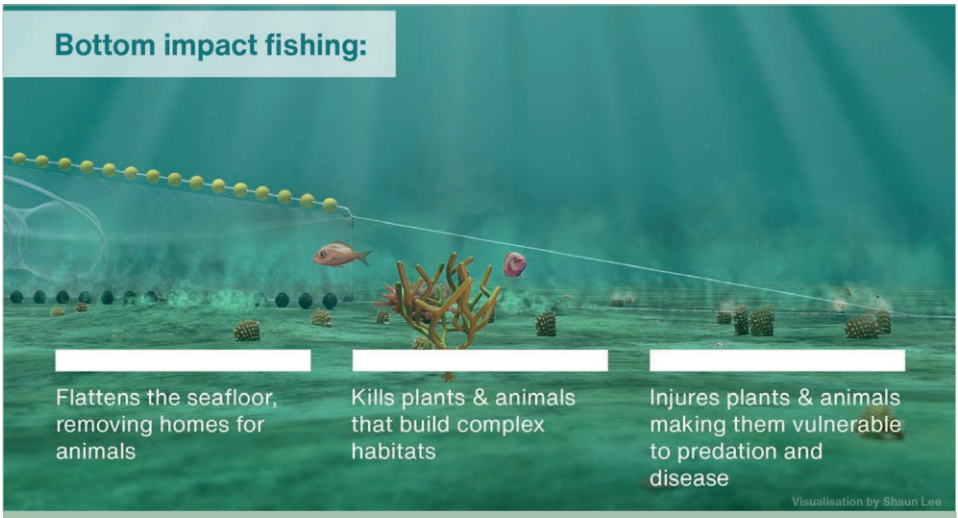
An Update on Marine Protection in the Hauraki Gulf/Tīkapa Moana/Te Moananui-ā-Toi

SHAUN LEE

Exotic caulerpa encroaching into a developing kina barren on Aotea (Credit: Shaun Lee)

Shaun is a regular visitor to Aotea who works on environmental issues affecting the environment. He is a diver, designer and photographer who worked on the last four State of the Gulf Reports.

Nearly seven years ago the *Sea Change – Tai Timu Tai Pari*, New Zealand's first marine spatial plan was launched. The marine protection directives within that plan called for a review of the way fish populations in the Hauraki Gulf Marine Park (HGMP) are managed, with the goal of banning all bottom impact fishing by 2025, establishing 13 new Marine Protected Areas (MPAs) – plus extending two existing ones, and establishing novel Ahu Moana marine areas which would provide for joint mana whenua and community management[1]. The Department of Conservation (DOC) and Fisheries New Zealand (FNZ) were to assess these non-binding directives by 2017. However, this did not happen until June 2021 when *Revitalising the Gulf*[2], a package of integrated marine conservation and fisheries management actions to improve the health of the Gulf was launched. A key part of this strategy is the *Hauraki Gulf Fisheries Plan*, which is New Zealand's first area specific fisheries plan. While this plan was signed off by the Minister of Oceans and Fisheries, Willow-Jean Prime, in August of 2023, consultation on the most contentious part 'bottom fishing access zones' (trawl corridors) continued, with submissions closing in December 2023. Here we look at these proposed actions and what is being proposed for protecting the moana around Aotea Great Barrier Island?



Impact of bottom fishing on the benthic surface (Credit: Shaun Lee)

The Hauraki Gulf Fisheries Plan

The *Hauraki Gulf Fisheries Plan*[3] is short on specific actions. The former Minister has made just one set of decisions since the plan was put in place, recommending increases in take for kina and gemfish[4]. However, an increase in kina removal does not address the cause of kina barrens - i.e. removal of kina predators, and so will not address the issue of kelp forest loss at Aotea and elsewhere in the Gulf. Restoration of the kelp forests and the sea life associated with them requires greater protection for the large predators, such as tāmure/snapper and kōura/crayfish, that were once abundant in these reef ecosystems. Based on these early Ministerial decisions of increased catches and 'fishing further down the food chain' many of us don't hold a lot of hope for a plan, which still allows bottom trawling and Danish seining to continue, albeit limited to 'trawl corridors'[5].

Marine Trawl Corridors

I was involved in helping with the modelling for the 'trawl corridors' but have been very critical of the decisions made and like nearly all the submitters have supported Option Zero – no bottom trawling or Danish seining in the Hauraki Gulf Marine Park.

All of the options proposed will allow some recovery of the seafloor habitat, but this may take many decades. However, recovery may be faster around Aotea where the water quality is much better than that of the inner Gulf. The decision to allow trawling in corridors to the east of Aotea, upwards of 90 times a year, will be very damaging[6].

An additional concern is the spread of exotic caulerpa by this fishing practice. While all proposed options move trawling to two nautical miles out from Aotea, the depth of water at this distance is less than 50m in a few spots, where potentially caulerpa could grow[7].

Legasea have done a great job campaigning for Option Zero[8] and a reduction in Total Allowable Commercial Catch (TACC) but the

corridors do not come with any changes to the TACC so fishers are likely to just change fishing methods that will result in further depletion of stock. I doubt moving the sites where trawling continues will result in an immediate surge in fish abundance around Aotea, as some tāmure/snapper look to be suffering from malnutrition. Dr Mark Morrison suggested that the Gulf would reach a carrying capacity for tāmure much lower than the original biomass because "we have degraded the benthic habitats they rely on"[9].

Marine Protected Areas

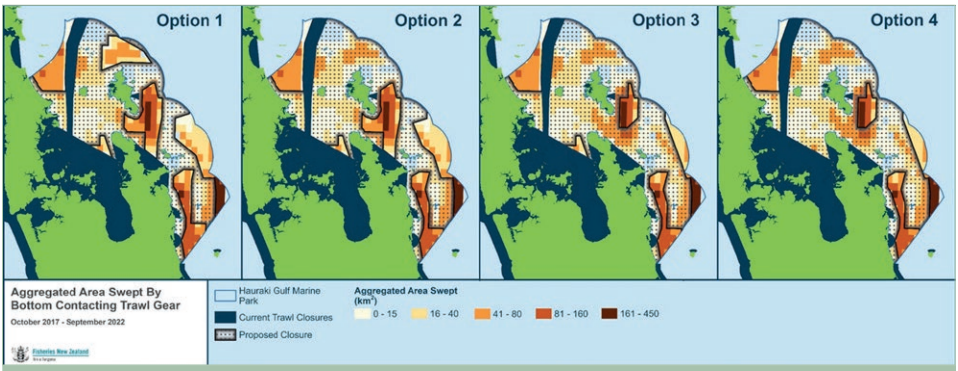
Another key aspiration of Sea Change was the establishment of a number of marine protection areas (MPAs). In the 2021 *Revitalising the Gulf*, 19 marine protection areas were proposed: extensions to two current marine reserves, and establishment of 12 High Protection Areas (HPAs) and 5 Seafloor Protection Areas (SPAs). Although there were no MPAs suggested for Aotea Great Barrier in the *Sea Change Marine Spatial Plan*, there was a specific management action recommendation that:

"By 2018, identify any gaps in the MPA network with specific attention to Waiheke Island and Aotea – Great Barrier Island. Establish further MPAs if required."

The Sea Change Stakeholder Working Group (SWG) was approached by community representatives from Aotea seeking that MPAs be included on Aotea Great Barrier but because the SWG also heard conflicting views and concerns at not being consulted regarding these proposals it was considered more appropriate for the location of MPAs for the two islands to be decided by those communities as part of the implementation of *Sea Change*. This did not happen.

Waiheke Island residents took matters into their own hands, with one group proposing a rāhui and another proposing a marine reserve. The Friends of the Gulf are campaigning for their proposed marine reserve, Hākaimangō-Matiatia (NW Waiheke)[10], to be included in the *Hauraki Gulf Marine Protection Bill*.

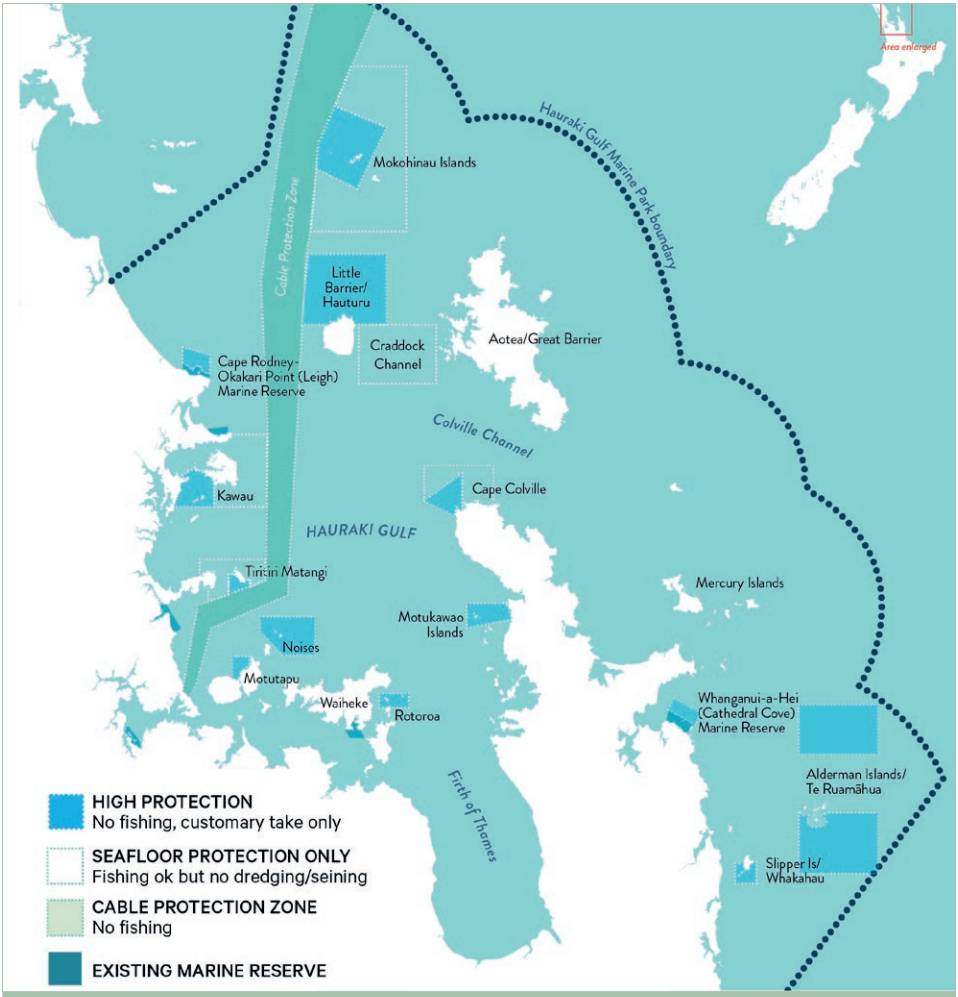
Legislation to establish these Marine Protection Areas was initiated in 2023, through the *Hauraki Gulf/Tīkapa Moana Marine Protection Bill*[11]. This bill passed its first reading in the house with support from all political parties and will now be considered by the Environment Select Committee under the new government. However, the coverage



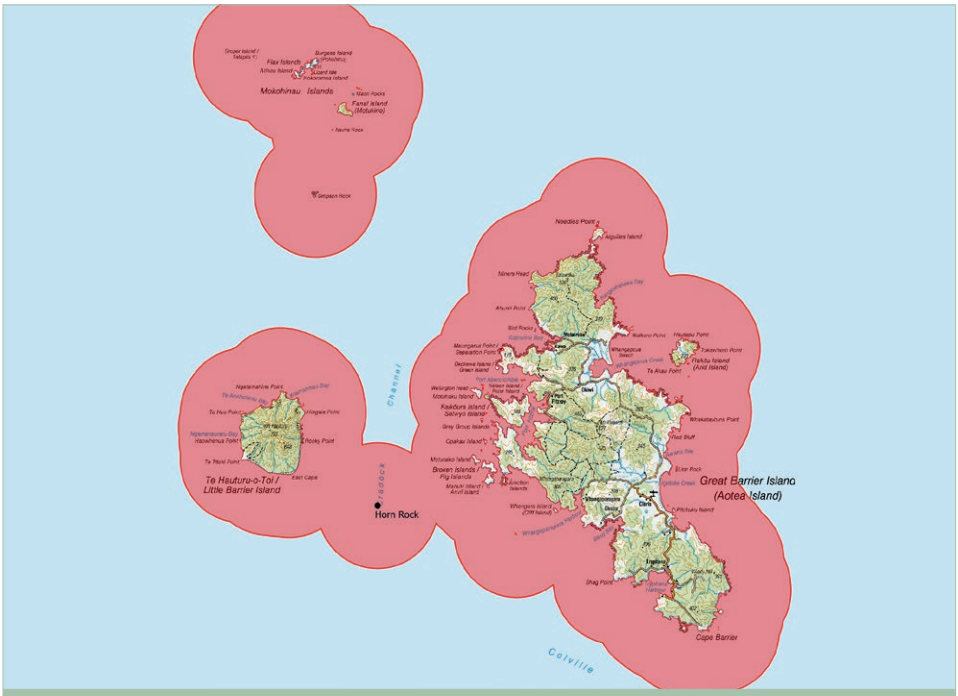
The four 'trawl corridors' proposed by Fisheries New Zealand

of protection falls well short of the Hauraki Gulf Forum's goal of 30%[12] with only 6.3% of the marine park likely to be protected to International Union for Conservation of Nature standards[13]. Aotearoa New Zealand is a signatory to the United Nations Global Biodiversity Framework 2030 where it commits to protecting 30%[14] of the marine and coastal environment yet currently sits at just 0.4%. Our government has a responsibility to support marine protection on Aotea if the community asks for it.

When the government finally did respond to *Sea Change* in 2021, their plan acknowledged that communities were seeking greater marine protection for Aotea Great Barrier Island, but offered no resources or leadership. However, they did offer some assistance with the establishment of an *Ahu Moana* pilot.



MPAs proposed by Revitalising the Gulf. Source: New Zealand Geographic . Note: a correction has been made to the original figure clarifying that fishing is not allowed in the Cable Protection Zone



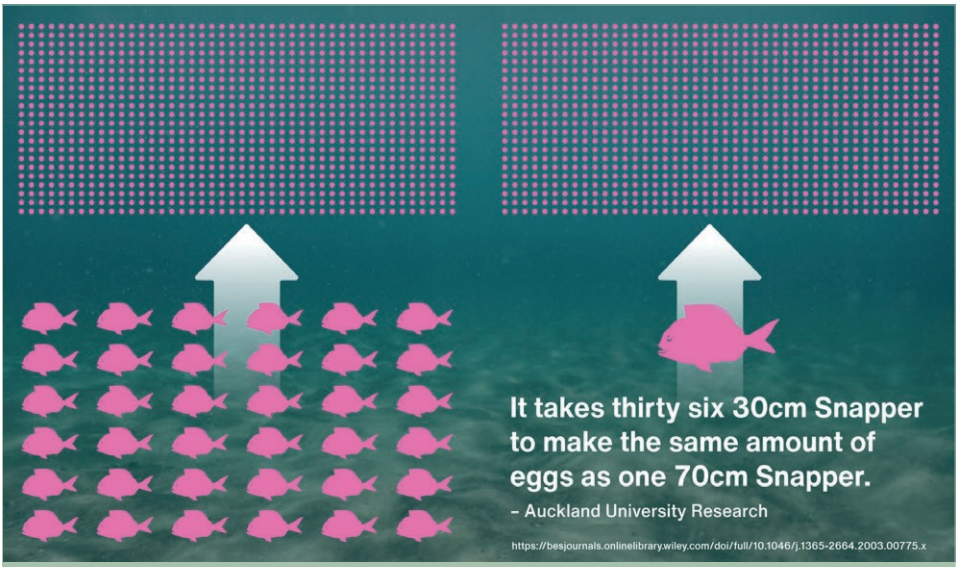
Map of area covered by Rāhui

Ahu Moana

Sea Change proposed a novel marine protection idea. Ahu Moana marine areas would be localized, near-shore, co-management areas along the entire length of the Hauraki Gulf and its islands. They would extend from mean high water springs (the high tide mark) out 1 km. The idea was picked up by the Aotea Great Barrier Local Board which promised further community engagement on the Ahu Moana approach in its 2020 Local Board Plan[15]. Feedback on the idea was overwhelmingly positive and the wording has been kept in the draft 2023 plan. Fisheries New Zealand promised to help with Ahu Moana in its response to Sea Change in 2021, however exotic caulerpa was found on Aotea the same month and progress seems to have stalled. Because the 1 km limit was not sufficient to provide good protection for kōura/crayfish[16] the Ahu Moana concept has not been championed by those seeking to restore kina barrens. However, that protection comes with the proposed rāhui, which extends 3 nautical miles into the moana. In October 2022 the first Ahu Moana pilot was launched at Aotea, under the guidance of Glenn Edney. For more detail on this visionary concept see accompanying article by Glenn in this issue.

The Rāhui

The temporary fisheries closure (rāhui) of Aotea and nearby islands (Te Hauturu-o-Toi/ Little Barrier Island, the Mokohinau Islands, Simpson Rock and Horn Rock) proposed by Motairehe Marae Trust and Ngāti Rehua Ngātiwai ki Aotea iwi trust board[17] could



Productivity of tāmure/snapper

really help. Although I have provided support for this rāhui, as has the Aotea Great Barrier Environmental Trust, it will not have the greater benefits to the fishery that will come with a MPA. With the recent change in government and a new Minister of Oceans and Fisheries, a decision on this rāhui is not expected till late summer.

Where to From Here?

Despite the added complexity that has come with the exotic caulerpa incursion this biosecurity problem has not reduced the need for more marine protection on Aotea Great Barrier Island. The previous government's weak response to *Sea Change* has left the island with little support for generating change. MPA's have a role to play in protecting large animals which make a major contribution to ocean productivity. Adult tāmure/snapper within the Leigh Marine Reserve were estimated to contribute 10.6% of newly settled juveniles to the surrounding 400 km^2 area, with no decrease for up to 40 km outside the reserve[18].

The landmark Environment Court ruling in 2019 allowing the Bay of Plenty Council to impose a fishing exclusion zone around Motiti Island following the MV Rena disaster, has paved the way for regional councils to protect indigenous biodiversity from the effects of fishing in their Coastal Management Plans (CMP)[19]. Auckland Councils CMP is in the current Unitary Plan, which runs until 2026. In their submission on the proposed marine protection areas[20], Auckland Council said:

> ***"The marine protected areas proposed in this consultation, and future release of the finalised Fisheries Plan, should provide certainty to support Auckland Council in considering fisheries controls in future reviews of the Auckland Unitary Plan, as enabled by the Motiti decision. It is likely that this will be considered in 2026."***

As the Coastal Management Plans only last for 10 years they are a bit more like a long rāhui than a Marine Reserve. But they comply with The International Union for Conservation of Nature marine protection standards. Such areas have been dubbed by some as RMA Protection Areas, after the legislation that created them. In Northland, the regional council have effectively upgraded an area that had a rolling rāhui that protected finfish, and protected another area from bottom trawling. The protections were fought by commercial and recreational fishing advocates – yes Legasea fought a trawling ban[21]. They did this on principle – Legasea are not an Environmental Group – there main concern is availability of fish to catch.

The rāhui tool is useful but cannot be used to protect an area for fisheries reasons. If you want to protect large, old productive fish this is not the tool to use. Rather it is the Fisheries Act. However, if you want to protect an area from the effects of fishing for another reason, say for a citizen science project, a cultural reason or even if you just think a lush kelp covered reef full of fish just looks better than a kina barren – you can ask Auckland Council to protect it. But it won't be easy, just the like MPAs proposed for the Gulf and the RMA Protection Areas sought elsewhere in Aotearoa it will likely be opposed by Legasea and commercial fishing organisations.

If you're thinking about rāhui, Ahu Moana, a RMA Protection Area or the next wave of long term marine protection for the Gulf – I urge you to get out there and document what's there. Start a journal, log stuff on iNaturalist.nz, make observations, share them and write them down. Because if there is one thing we have learnt – marine protection for Aotea won't just happen by itself.

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Reflections on Motu Kaikōura

BARRY SCOTT (AGBET Trustee and Environmental News Editor)

Collecting harakeke on Motu Kaikōura (Credit: Barry Scott)

In the first week of December 2023 Lotte McIntyre organized a working bee on Motu Kaikōura for the Oruawharo Medlands Ecovision (OME) volunteer group. With an invitation to join them I leapt at the chance so on the first Monday of December ten of us were ferried out to the island from Port Fitzroy by Clint Stannard, Motu Kaikōura Trust ranger on the island. During the two days we were there we cleared vegetation around the cabins and the loop track, dug out and replanted around 70 harakeke, cleared about 60 rat traps along 10 km of tracks, and dealt to some of the wilding pines near Bradshaw Cove.

Motu Kaikōura is a large island (564 ha) off the northwestern coast of Aotea Great Barrier Island. Its location provides a natural physical boundary between the Hauraki Gulf and Aotea, which gives rise to the magnificent, sheltered harbour of Port Fitzroy behind it. After over a century of private ownership, and use for livestock grazing, the island was transferred into public ownership in 2004, principally through funds provided by the government Nature Heritage Fund. It was gazetted as a scenic reserve with administration of the island ceded to the Motu Kaikōura Trust, a group comprised of representatives from the New Zealand Native Forest Restoration Trust, Friends of Tiritiri Matangi and Ngāti Rehua.

Since 2005 it has been an open sanctuary for native flora and fauna, under continuous pest control. It has significant potential as an island for recreation and conservation.

The island has a long history of Māori occupation, which started in the late 14th century. By the 15th century the island was occupied by several tribes, collectively known as Ngāti Tai. They are reported to have lived on the island through to the late 17th century when they were overthrown by Ngāti Wai. Many inter-tribal battles occurred over the centuries with Ngāti Rehua being the sole occupiers of the island by the 1800s. Kaikōura along with much of Aotea was sold by Horeta Te Taniwha to Webster, Nagle and Abercrombie in March, 1838[1].

The long period of settler occupation and farming on the island had a serious impact on the flora and fauna of the island. Grazing by pigs, goats and deer, combined with burning, left the island devoid of its original forest vegetation and a soil seriously depleted of organic material and very prone to erosion, particularly on the less sheltered northern and eastern sections of the island. But by 2008 fallow deer, pigs, cats and rabbits had all been eradicated from the island. While an attempt was made to eradicate rats this was unsuccessful as ship rats were detected on the island within 7 months of the toxin drop. Given Man of War Passage is just 80m in width, ship rats could easily have re-invaded by swimming across this gap. However, kiore, which are known to be poor swimmers, were also present after the toxin drops, suggesting that the toxin drops did not result in a 100% kill. Despite this set back rat numbers have been kept relatively low, through an active rat trapping and baiting programme, which has been maintained since 2014 when Clint was appointed Ranger. A goal of the Trust is to maintain rat numbers at a relative abundance index of less than 5%. Currently, there are a total of 843 rat traps over a track network of 29.8km (16.5 km around the coast) and 572 bait stations. These are serviced once a month. Lotte cleared around 60 of the rat motels, plywood boxes containing two traps and two bait blocks, on the NW section of the island on our first day and also got to see a copper skink in one of the stations as well as several moko skink around the rat motels.

The Management Plan adopted by the Motu Kaikōura Trust is to allow the flora on the island to restore naturally with the only interventions being weed and pest control[2]. Regular pest plant surveys by Auckland Council together with control work has

Top: Clint with harakeke in his boat (Credit: Barry Scott). Bottom: Kim Bannister and Prue Smith planting harakeke (Credit: Barry Scott)

Frances McClure, Clara Safioti and Lotte McIntyre removing wilding pines (Credit: Barry Scott)

Thelymitra orchid (Credit: Barry Scott)

helped keep pest plant species on the island relatively low. Council efforts to date have resulted in the eradication of three pest plant species, and ongoing efforts are targeted at eradicating others such as moth plant. The island is free of kikuyu, but has isolated pockets of a number of other weeds, and still a significant number of wild pines (*Pinus contorta* and *P. pinaster*). While many of the large pines have been removed some have been retained as they appear to be important as a food source for the kākā population on the island. However, the downside of leaving mature pines on the island are the large number of wilding pines that are now growing across the island. On day two of our visit we removed a couple of hundred of these growing alongside the track that winds through the valley above Bradshaw Cove. But next time we will come armed with electric saws, which should enable more effective removal.

While several flora and fauna surveys have been carried out across the island there has not been any systematic ecological study to monitor the changes that have occurred since the removal of goats, pigs and fallow deer since 2008, but Clint shared with us that he has seen dramatic changes in the 10 year period he has spent on the island. A good example was the site on the southern coast where we collected the harakeke, which was once just exotic grasses but is now covered in dense clusters of harakeke. The most marked vegetation changes are in the sheltered valleys where there is better retention of moisture and reduced impact of wind, allowing the native vegetation to successfully regenerate, as in the lower reaches of the valley where we removed the wilding pines. The flora on the island can be arbitrarily divided into the kānuka woodlands of the southern, northern and western slopes

of the island – the predominant type; the broadleaf forest of the southwest region; and the kauri associated forest that grows east of Houseboat Bay.

While there is a 'no intervention' policy for restoration of the vegetation, it was clear that for some species such as kauri, where the number of trees is very low, it will take many years for them to fully re-establish on the island. I could not help but contemplate whether some judicious planting of seedlings of some of the bigger trees, especially those whose seeds are not distributed by kererū, might accelerate the restoration process and also help restore greater numbers of birds and invertebrates. While removing the wilding pines on the track through the valley above Bradshaw Cove we spotted a few small kauri, a single miro, and two large mature towhai in flower. Where there is serious erosion along the top of the island near the airstrip and along the northern coast, restoration is a much slower process. Unfortunately, these are open sites that are rapidly occupied by weed species such as gorse, prickly hakea and wilding pines. With more working bees like ours, and armed with a better array of gear, the wilding pines could be removed across large areas of the island before they become much larger and more difficult to remove.

Motu Kaikōura like most of the islands around Aotea would once have been teeming with seabirds. While Cooks Petrels are regularly heard flying across the island at dusk, no active burrows for petrels or shearwaters have been found on the island. It would be interesting to see how this might change if both kiore and ship rats were totally eradicated (mice are absent from the island). Maybe even then some intervention might be required to get some of these species re-established on the island. It is clear looking at a topo map of Aotea that the weak link in keeping islands like Motu Kaikōura and the Broken Islands rodent free, is the large peninsula between Wairahi and the Hauraki Gulf, which will remain as a 'rodent feeder' until such time as this area or the whole island is free of predators.

Fluttering shearwaters in Port Abercrombie (Credit: Barry Scott)

Fluttering shearwaters in Port Abercrombie (Credit: Barry Scott)

At least four species of skink are known to be present on Motu Kaikōura – moko, copper, shore and ornate skink. The latter was recently found at several sites during a biodiversity survey by the Motu Kakōura Trust and highlights the value of ongoing rodent control[3]. But which species of geckos are on the island is less clear, although Clint did spot what was probably a Pacific gecko in December 2021. In addition the Trust is compiling a list of insects known to be present on the island with the help of veteran entomologist Peter Maddison. To date, a total of 75 different species have been recorded and will soon be listed on their website. The status of short tailed and long tailed bats on the island is also not known.

The two days on the island was a great opportunity for everyone to become much more familiar with the flora and fauna of the island, its history, and the impacts of introduced mammalian pests. It also provided a wonderful opportunity to see how we could contribute to the restoration of the flora and fauna of the island. Removal of wilding pines is an obvious one. Dealing to the ship rats and kiore is the same challenge as it is on Aotea Great Barrier Island. It was interesting to hear from Clint that besides the Man of War Passage the other main re-invasion site for the island is the small channel that separates Motu Kaikōura from Nelson Island and in turn from Motuhaku, where there is currently little rat control. It would be great if Tū Mai Taonga could persuade the owner of these two islands to have them eradicated of rats. This would help reduce the population of rats on Motu Kaikōura significantly and better restore all three islands as safer havens for the seabirds of the Hauraki Gulf to nest and breed.

One major impediment for those wanting to visit, walk, explore, volunteer or carry out research on the island is transport. At present there is no regular water taxi service from Port Fitzroy to Motu Kaikōura so you either need to have your own boat or find someone willing to take you out to the island (and back). This is a great pity as there is good accommodation there to stay with several

Coastal waters on SW corner of Motu Kaikōura with Barry in kayak (Credit: Mead Norton)

cabins and the recently completed (2019) solar powered lodge for communal meals and gatherings – and a pretty good library of books.

Since the working bee I have once again visited and stayed on the island for two nights after kayaking up the western coast from Whangaparapara through Bowling Alley and the Broken Islands. On the second day, we did a complete circumnavigation of Motu Kaikōura, Nelson Island and Motuhaku where we enjoyed a totally different perspective and experience of the island. Paddling alongside a flock of no less than 300 fluttering shearwaters by the passage between Motu Kaikōura and Nelson Island, exploring all the little bays and coves around the three islands and looking at the dramatic geology of the volcanic coastline, were all highlights. Looking through the clear blue waters at the fish and beautiful red, brown and green algae growing around the coastline brought home to me once again what is at stake with the spread of exotic caulerpa through these waters. Stopping the spread through Ports Abercrombie and Fitzroy is really something worth fighting for.

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