THE HAURAKI GULF MONITORING PROJECT: A SUMMARY FROM 2017 – 2020

Waiheke Primary School at Whakanewha Regional Park

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EXECUTIVE SUMMARY

The Hauraki Gulf Monitoring Project (HGMP) is a coastal monitoring project that uses citizen science to gather information on biodiversity of the intertidal community of the Hauraki Gulf – Tikapa Moana. The HGMP uses the Marine Metre Squared (Mm2) methods (www.mm2.net.nz) to collect data on the diversity, abundance and distribution of invertebrates and seaweeds and small fish living between the tides. The project began in 2017 and this report summarizes the finding and outcomes over that four year period.

Some key highlights from 2017-2020 include:

- Over 800 people from 19 different schools and community groups have participated
- 259 metre squared quadrats have been surveyed
- **19 locations** around the Hauraki Gulf have been monitored
- Four of these locations have three years' worth of monitoring data
- Over 200 unique species have been identified
- **Two invasive marine pests** have been recorded at two locations

This project would not be possible without the engagement and enthusiasm of the schools and community groups involved nor without the support of Foundation North, the New Zealand Association for Environmental Education (NZAEE), the New Zealand Marine Studies Centre, Sir Peter Blake Marine Education and Recreation Centre and the past co-ordinators of the project Dr Mels Barton, Shanthie Walker and Aless Smith.

Table of Contents

INTRODUCTION

The Hauraki Gulf Monitoring Project (HGMP) was established in 2017 when Foundation North provided funding to the New Zealand Association for Environmental Education (NZAEE). Seeing a need to further engage with communities (particularly young people) in becoming kaitaiki/guardians of the Hauraki Gulf – Tikapa Moana/ Te Moananui-ā-Toi, the HGMP builds upon the annual event 'Seaweek'(also run by the NZAEE). The HGMP aims to encourage our connection with the coastal environment, develop an ethos of guardianship/kaitiakitanga and support environmental action projects to increase understanding how our activities affect the coastal environment.

To achieve these goals, the HGMP has utilised Marine Metre Squared (Mm2) as a tool for monitoring seashore ecology over time. Mm2 is a nationwide marine-focussed monitoring project that relies on the general public to gather information about what is living on their local seashore. Using a standard ecological surveying method, Mm2 is an effective way to encourage communities to look closer, get to know their local seashore and monitor change over time. This demonstration of citizen science – where the public participates in a scientific project (often through data collection) – can create partnerships between sectors, promote environmental awareness, involved local communities in science and kaitiakitanga/guardianship.

Through collecting the data themselves, participants not only have the opportunity to develop practical science skills but also gather data for useful measures of ecosystem health such as biodiversity, species abundance and distribution. Collection of baseline data is very valuable for long-term ecological monitoring and provides the opportunity to look at change in the biological community over time or other ecological parameters. It provides schools and community groups with a procedure to investigate questions that are of local concern and encourages them to regularly check the health of their local shore through monitoring.

Unusual observations can provide an early warning system for environmental managers/local councils and the data collected can potentially supplement their scientific monitoring programmes. One issue of high relevance to the Gulf, given the volume of international shipping vessels through this area, is the issue of marine pests. In 2020, participants were asked to identify different marine pests and investigate the impacts of marine pests on marine communities. Any sightings of marine pests found during the Mm2 surveys were flagged and reported back to members of the Biosecurity team from the Ministry for Primary Industries (MPI) in Auckland. MPI and Biosecurity New Zealand were involved in the recent development of the marine pests tab on the Mm2 website (www.mm2.net.nz/resources/marine-pests) and were regularly consulted with about the progress of the 2020 project. This led to some of the Auckland based staff from MPI and Biosecurity New Zealand participating in two of the data collection trips.

Now in its fourth year of monitoring, the HGMP has a baseline of information to be used in future for assessing the state of environment and changes over time. Many schools have been involved in the project for multiple years. By consistently surveying the marine community in the same locations year after year, this can provide a better understanding of how local shorelines are changing over time. This report reviews the data collected about the marine community across the years of the HGMP (2017-2020). In addition, the learning outcomes for the 2020 participants involved in the HGMP were assessed through the use of open-ended survey questions and a self-efficacy questionnaire.

METHODS

Structure of the Project

The HGMP is made up of six contact sessions with the project co-ordinator over the course of the year with each participating school consisting of an introduction session, two data collection trips, two data entry classes and a summary session. The HGMP would commence after Seaweek (end of February/beginning of March). Data collection trips spaced out throughout the year to allow for seasonal sampling and to fit in with scheduled low tides and term times.

Introduction Session (classroom)

This session introduced the HGMP to the students and put forward the following key questions each group:

- Why should we engage with this project?
- What does this information tell us about our marine environment?
- What is impacting on our marine environment?
- How can we better understand what is affecting our coast?
- What can we do to help restore our coastal environment?

A brief explanation of how to complete a Mm2 survey was also provided during this session.

Data Collection (field trip to sampling site)

Field trips for two hours to allow for groups to complete two Mm2 surveys. Substrate (recorded as percentage cover) and species were recorded in a 1m2 quadrat for each survey. Algal species and colonial animals were recorded as a percentage cover whereas other species were recorded as a count. Additional environmental data (e.g. temperature, salinity, water clarity) was sometimes recorded when equipment was available. For estuarine/beach environments, infauna samples were collected using 10cm cores dug into each corner of the quadrat. The data collection forms used for 2020 are included as part of the appendices (Appendices 1a and 1b). It should be noted that when assessing the species data collected during the course of HGMP, it is assumed that species identification was confirmed by the project co-ordinator/scientist who was present during data collection field trips.

Data Entry

Data was entered into the Mm2 website (www.mm2.net.nz) under the project name ‘Seaweek’ (2017-2019) and ‘Hauraki Gulf Monitoring Project 2020’ with the assistance of the project co-ordinator. Simple comparisons were done between different tidal levels and previous sampling periods. The website provides a place to store their data and has built-in simple data analysis tools to support the community to ask questions of local concern and investigate issues that may impact biodiversity.

Summary Session

Summary sessions comprised of reviewing the results from the completed Mm2 surveys. The data collected as part of the project was placed into a real world context of what this information means for the monitoring of the Hauraki Gulf. Ideas were collated about how groups could change/improve on their investigation, continue monitoring, take environmental action and share their findings with the wider community.

Modifications for 2020

In 2020, due to interruptions resulting from the COVID-19 pandemic, field work was reduced to one session in September followed by a combined data analysis and summary session back in the classroom. Data collection sessions occurred between the 14th-20th September 2020. Due to further COVID-19 regulations and poor weather, some school groups had their data collections delayed until October and November.

In place of an introduction session, effort was put into supporting home and classroom learning in preparation for the field work. This included the development of lesson plans, indoor activities, analysing previous years' data, and sharing marine knowledge via social media platforms and e-newsletters (see Appendix 2 for examples). After completing the prescribed lesson plan, schools were offered a Q+A session with the HGMP co-ordinator via Zoom, however few schools took this offer up as a result of issues with student availability and varying access levels to technology.

When one data collection for a school was postponed due to bad weather, representatives from MERC, MPI, Biosecurity New Zealand and the current and previous project co-ordinator collected data on this occasion instead. Prior to this, a meeting between these representatives, in addition to a representative from the Hauraki Gulf Forum, was held at MERC to discuss the progress of the 2020 project and next steps if the HGMP is continued. To conclude the project, participating students were invited to report back to members of Auckland Council and the Hauraki Gulf Forum at a Hui in November 2020.

Evaluation of Learning Outcomes for Students

Teacher Reviews

Teachers were asked to complete a questionnaire about various aspects of the project including; strengths of the project, project organisation, value to student learning as well as their own and relevance to the science curriculum (Appendix 3). Teacher responses were entered on SurveyMonkey™.

Environmental Efficacy

This year a self-efficacy for environmental action questionnaire was used based off a template designed by staff at the Cornell Lab of Ornithology[1] (Appendix 4).

[1]Porticella, N., Phillips, T., Bonney, R. (2017) Self-Efficacy for Environmental Action Scale (SEEA, Custom). Technical Brief Series. Cornell Lab of Ornithology, Ithaca NY.

The purpose of this questionnaire was to gather insight on participants' confidence in their ability to effectively address environmental concerns surrounding the seashore. The survey was made up of 8 questions using a 5-point Likert scale and responses were averaged for each student. Data was cleaned as instructed by protocol supplied by the Cornell Lab of Ornithology[1].

Any individual that did not respond to 25% or more of the questions was excluded from the results. Responses were also checked for repetitive responses (a possible indication that the respondent was not reading the questions), however this was not applied to questionnaires that consistently selected with midpoint responses.

Each participant had an average score calculated for their responses. Scores were then averaged for all those whom completed the questionnaire ('the overall all group score'). Scores that were below 3 indicated that participants had low levels of confidence to address environmental concerns for the seashore, whereas scores above three indicated that students were confidence in their ability to address environmental concerns relating to the seashore.

In addition to the self-efficacy questionnaire, students had a short survey to complete including questions on why they would like to continue monitoring the Hauraki Gulf in the future and what they most important thing/s they learned during the project (Appendix 4). One of the questions in the survey asked students to describe the HGMP in three words and their responses were compiled into a word cloud.

Teacher / Community Workshops

During the four years of the HGMP, additional workshops (primarily aimed at teachers and environmental educators) and community events were held to demonstrate Mm2 and how it can be used as a practical educational tool to encourage environmental advocacy and develop science skills. Workshops have been held at Sir Peter Blake Marine Education and Recreation Centre (MERC), Kelly Tartlons SeaLife Aquarium, Whangarei and Maraetai. A community event also promoting Mm2 and seashore exploration was held at Browns Bay.

In 2020 and 2019 as part of the five-day long 'Blake Inspire for Teachers Programme' (**https://www.blakenz.org/programmes/blake-inspire/blake-inspire-for-teachers/**), there has been a day dedicated to the Mm2 project where teachers collect their own data and discuss how this can be incorporated into environmental learning back in their classrooms.

Educational Resources

Schools that participated in the project received a resources pack with a selection of resources produced by the NZMSC in both English and Te Reo Māori. These included shore guides, activity booklets and posters, a copy of Collins Field Guide to the New Zealand Seashore and instructions on how to complete an Mm2 survey and make a 1m2 quadrat. Mm2 sampling field gear was supplied or loaned to schools that needed it. The Hauraki Gulf Forum provided copies of the 2020 'State of the Gulf' report and Hauraki Gulf Marine Park posters. Marine Pests Guides were supplied by MPI and distributed to participating schools.

These packs were also supplied to schools/groups that were not able to fully commit to the HGMP but were highly interested in trying out Mm2 on their own schedule. Other relevant resources on the intertidal ecology available on the Mm2 website (https://www.mm2.net.nz/resources) were highlighted to the teachers.

Development of further supporting resources was a focus for 2020. These resources were designed to be part of an in-class lesson, delivered by teachers/educators, to assist their students in their preparation to visit the shore. Activities included in this lesson plan encouraged gathering background information about the Hauraki Gulf and the issues it faces (with an emphasis on marine biosecurity). They are readily available on the Mm2 website (https://www.mm2.net.nz/get-involved/hauraki-gulf-monitoring-project).

RESULTS

Level of Participation

Over the duration of the project, 19 different schools and community groups have fully participated (defined as completing all six sessions of the project) (Table 1). This equates to over 800 individuals (750 students and 70 adults/teachers) participating in the HGMP. Of these groups, 42% have participated in the project more than once (Table 1). Groups have predominantly represented primary school aged students, however, intermediate and secondary aged students along with groups with varying age demographics (i.e. community groups) have also taken part.

Sampling Locations

19 different locations have been sampled during the HGMP (Fig 1; Table 1). The majority (58%) of these locations have been identified as a rocky intertidal environment (Fig 1; Table 1). Four out of the nineteen locations have now been monitored for three years (Fig 1; Table 1). 259 metre squared quadrats that have been surveyed during the HGMP.

Biodiversity

Over the duration of the project, participants have identified over 200 unique species that reside in the Hauraki Gulf in both sandy/muddy shore and rocky shore environments (Fig 3). Each year of the HGMP, an average of 128 unique species were identified (Fig 3). However, when standardising the number of unique species identified by the survey effort (number of quadrats) per year, 2020 has a higher diversity compared to previous years of the project (Fig 4).

Invasive Species

Two invasive species – Wakame/Asian Kelp (*Undaria pinnatifida*) and the Mediterranean Fanworm (*Sabella spallanzani*) were found during the HGMP (Fig 2). Wakame was only located once at Long Bay Regional Park in 2020 whereas the Mediterranean Fanworm was found in both 2019 and 2020 at Waiake Beach (2019), Takapuna rockpools (2019) and Long Bay Regional Park (2020) (Fig 2).

Learning Outcomes for Students

Student responses (n = 113) to the self-efficacy questionnaire indicated that they were confident in their ability to address environmental concerns on the seashore (overall all group score = 3.9 / 5). Overall scores did not appear to be affected by the age of the participants or school they attended. Students' response to describing the HGMP were compiled into a word cloud (n = 309) (Fig 5). Size of the words in the word cloud were determined by how frequently they appeared in the students' responses (Fig 5).

Feedback from students and teachers

In the responses (n = 7) to the 2020 teacher/leader evaluation, all respondents thought that the strengths of the HGMP were: its hands-on nature, exploration of local natural environment, science expertise of the staff and participation in an authentic science research project. use of scientific equipment and resources (86% of responses) and support for environmental action and stewardship (71% of responses) were also thought to be strengths of the project. Overall, most respondents (86%) thought that the HGMP was very valuable for students. All respondents that were involved in the project in 2020 are eager to be involved again next year.

Teachers feedback

Q: Did the programme enable you to extend student learning and understanding beyond what is possible in the classroom?

"We are completing the marine meter square project with senior students, however it was great to have specialist knowledge and in addition to give PD to another member of staff." – Chemistry, Science and Marine Science Teacher Wentworth College

"Fantastic for better understanding of biodiversity/adaptations/how scientists work" – Science teacher Wentworth College

Q: How did the topic link with your current school theme or inquiry unit?

"We have had a whole school focus on "Protecting Our Big Backyard" linked to one of our school values of Kaitiakitanga. The whole school has been learning about Orangihina and Harbour View. In science we have been looking at ecosystems, food chains, food webs, interdependence, adaptations, endemic, native and introduced species etc..." - Year 8 GATE Science Teacher, Te Atatū Intermediate

"We are studying ecosystems. This project allowed us to investigate the unit with appropriate scientific expertise and a real life context to help us." – Year 5/6 teacher Waiheke Primary

"We were looking into Long Bay Marine Reserve as part of our 'special place' inquiry unit. This linked in perfectly and was such an engaging and educational experience for students." – Year 3 teacher Long Bay Primary

Student Feedback

Q: Describe why would you like to continue monitoring the Hauraki Gulf in the future:

"It's fun and good for learning. I think it is important." – Year 5/6 student, Waiheke Primary School

"Because Waiheke is our home and we need to protect our environment" - Year 6 student Waiheke Primary School

“To improve my knowledge and to make others more aware of our marine animals” - Year 9 student Wentworth College

“Because the ocean is very important to my family and if I do my part to help with the problem then hopefully that will make an impact” - Year 9 student Wentworth College

“I would like to continue because I would like to see how it changes throughout the seasons” - Year 8 student Wentworth College

“To see if they are any changes or no changes to the environment that I have surveyed.” - Year 9 student Wentworth College

“I like going to the rock pools and seeing the animals” – Year 6 student AGE

“I would like to continue monitoring the Hauraki Gulf so that we will be alerted when somethings is wrong with our ecosystem and we can keep everything healthy” – Year 8 student Te Atatū Intermediate

Q: What is the most important thing they have learned during the project?

“About the pest surveys and biosecurity” – Year 5 student Waiheke Primary School

“That protecting the ocean is important and that you need to try your best helping.” Year 5 student Waiheke Primary School

“That even if you do a small amount of work it makes a big impact on the research that the scientists are doing” - Year 9 student Wentworth College

“I’ve learnt how to use a quadrat and learning how to identify some species” Year 9 student Wentworth College

“What the metre square is and the marine pests and how to look after the Hauraki Gulf” – Year 3 student Long Bay Primary School

“That there is a lot more invaders than you think” - Year 4 student Long Bay Primary School

“The most important thing I learned is there is a lot pests (sic) and they travel on ships” - Student Long Bay Primary School

“That we need to stop thinking for ourselves and think for others” - Year 4 student Long Bay Primary School

“That it is important to monitor and keep track of the fauna and flora around us” – Year 8 student Te Atatū Intermediate

Engagement with Mm2 in Auckland and Northland

Over the course of the HGMP, the number of registered Mm2 users (individuals and groups) in Auckland has grown from 340 in 2016 to 741 users as of November 2020 – a growth of 127%. Similarly, in Northland the number of users has also increased by 127% from 99 users in 2016 to 225. The number of Mm2 surveys entered into the website from the Auckland region has had a large increase from 113 surveys entered in 2016 to 527 surveys entered in 2020 (336% increase). There has also been an increase in the number of surveys entered from the Northland region from 5 in 2017 to 26 in 2020 (26% increase).

FIGURES AND TABLES

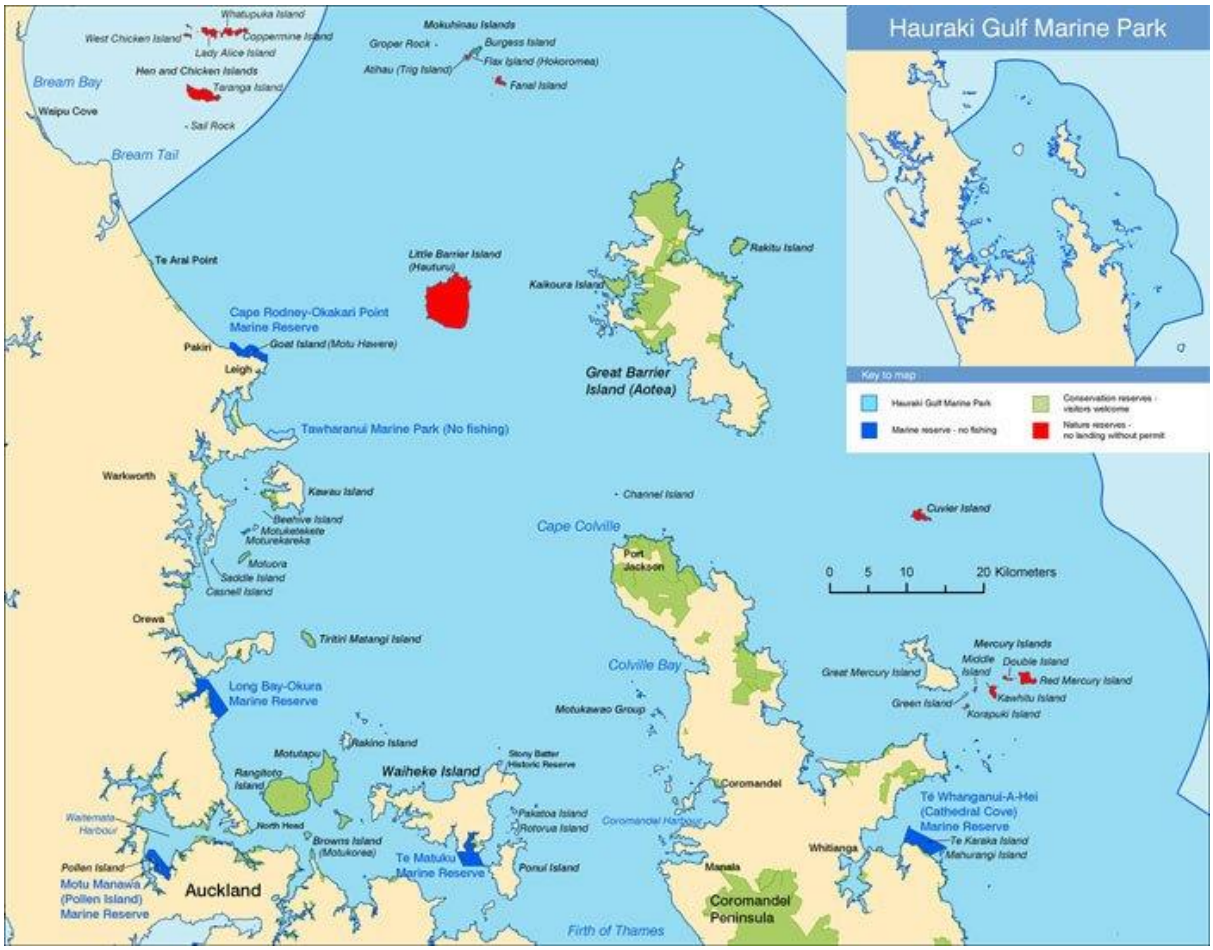

Figure 1: Map of the Hauraki Gulf Marine Park (image source: Department of Conservation)

Figure 2: Map of the locations sampled in the Hauraki Gulf Monitoring Project (2017-2020). Blue markers indicate rocky shore environment, yellow markers indicate sandy shore environment. Red asterisks represent locations where marine pests have been found (n= 19).

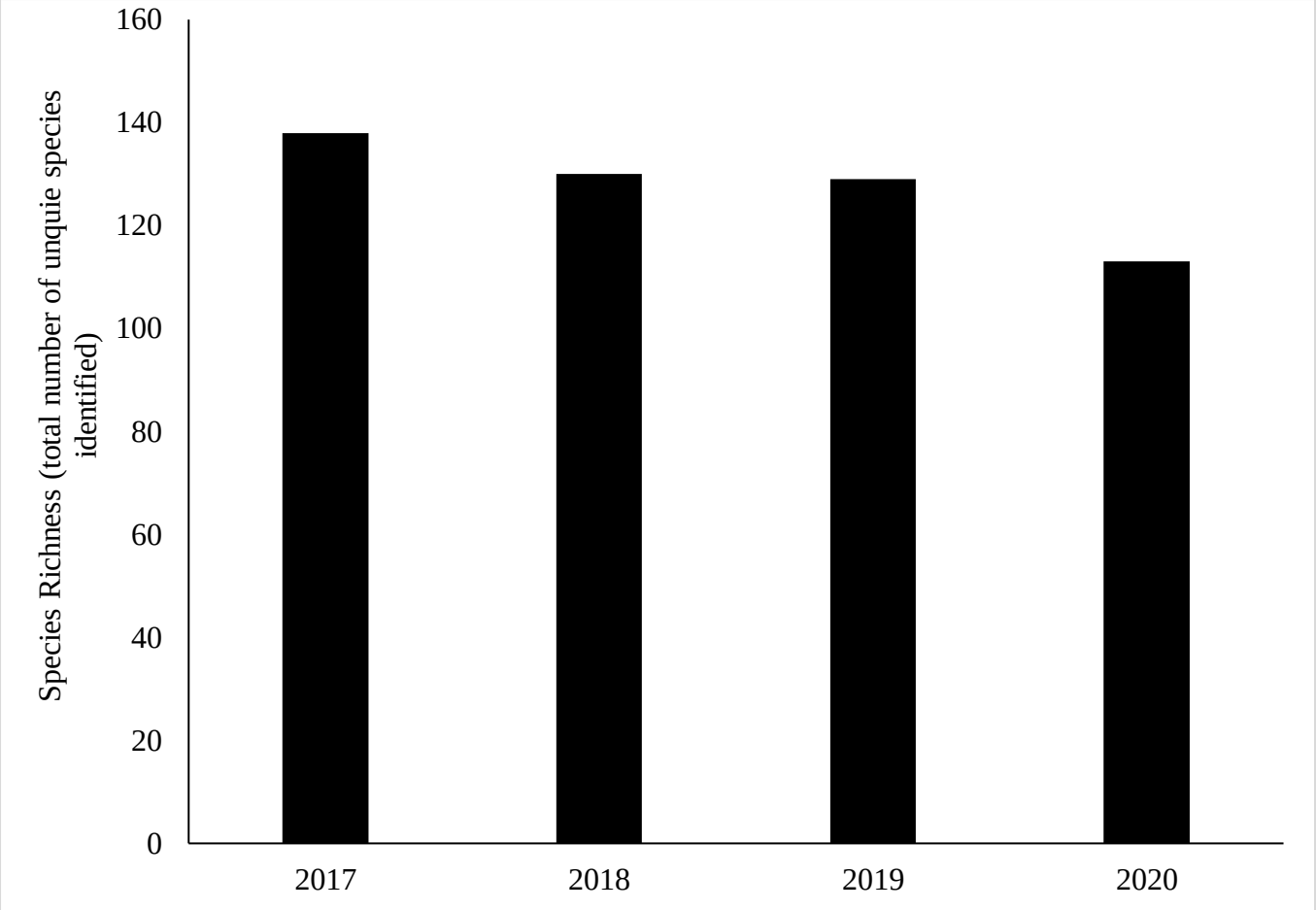

Figure 3: Species richness (total number of unique species identified) during each year of the Hauraki Gulf Monitoring Project (2017-2020) ($n_{\text{unique species}} = 205$)

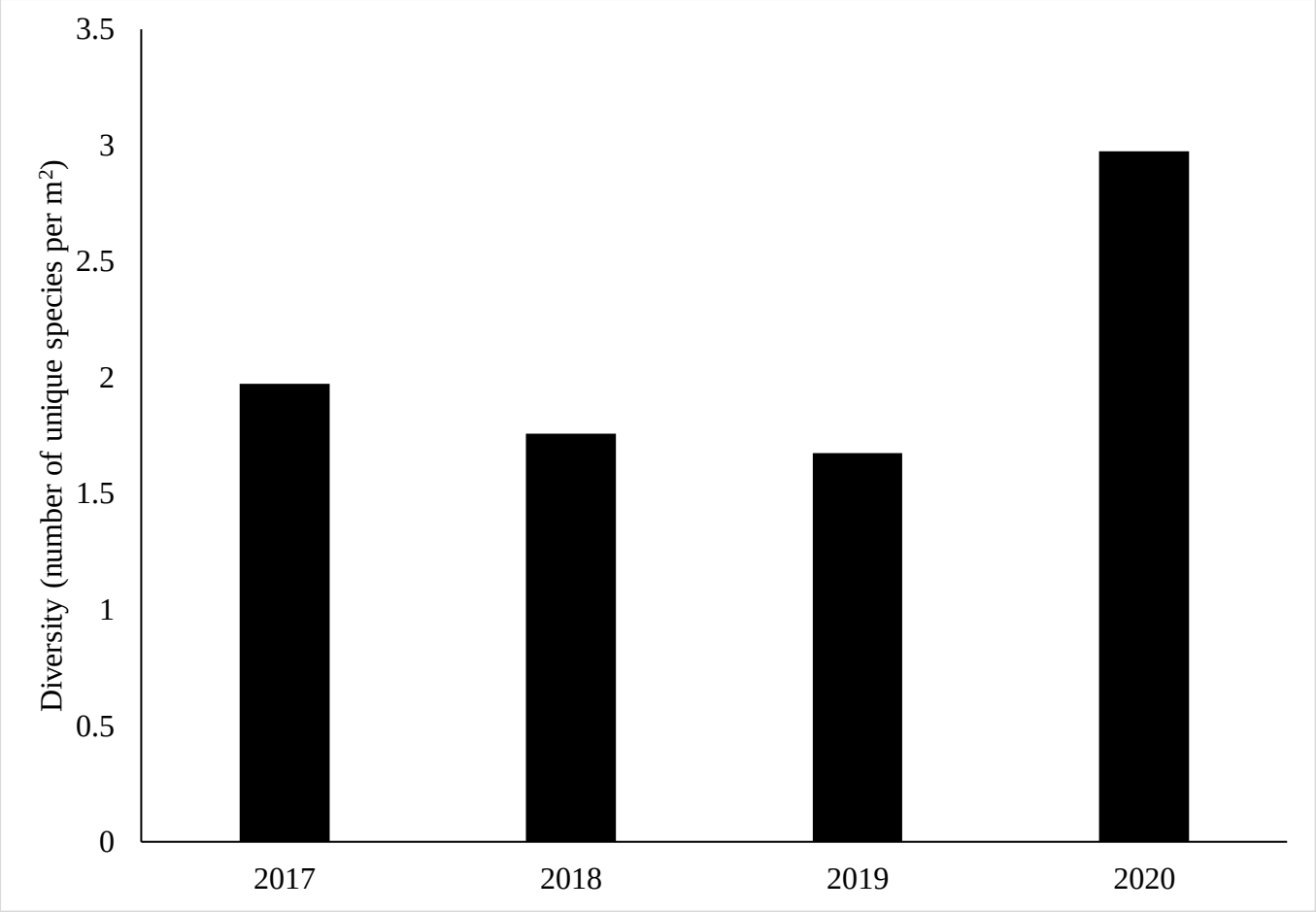

Figure 4: Diversity (number of unique species per m^2) during each year of the Hauraki Gulf Monitoring Project (2017-2020) ($n_{quadrats(2017)} = 70$, $n_{quadrats(2018)} = 74$, $n_{quadrats(2019)} = 77$, $n_{quadrats(2020)} = 38$)

Figure 5: Word cloud complied of words that students associated with the HGMP 2020. The size of the words was determined by the amount of times that certain words were bought up by students (n_{words} = 309)

Table 1: Summary of school/community groups and locations for each year of the Hauraki Gulf Monitoring Project (HGMP). RS= rocky shore, SS= sandy/muddy shore

School/Community Groups (n=19)	Location (n=19)	Participated in:			
		2020	2019	2018	2017
Colvillle Harbour Care Group	Bree Rocks (RS)	X*	X		X
Colvillle Harbour Care Group	Bree Rocks (SS)				X
Balmoral School	Coyle Park RS)	X			
HGMP Project Co-ordinator	Coyle Park (SS)	X			
Sunnyhills Primary School	Farm Cove Estuary (SS)			X	X
Verran Primary School	Little Shoal Bay (RS)		X		
Long Bay Primary/HGMP Project Co-ordinator**	Long Bay Regional Park (near MERC) (RS)	X			
Wentworth College	Manly Beach (RS)	X			
Bucklands Beach Primary	Musick Point (RS)				X
Mahurangi College	Omaha Beach (SS)		X		
Te Atatu Intermediate	Orangihina Reserve/Harbour View Reserve (SS)	X	X	X	
Beachlands Intermediate	Pine Harbour/Green Bay (SS)		X	X	X
Whau River Catchment Group	Rosebank Domain Saltmarsh (SS)			X	
AGE	Takapuna Beach (RS)	X	X	X	
St Leos School	Torpedo Bay (RS)				X
Maraetai Primary	Tracey's Point/Walk, Maraetai (RS)			X	X
Long Bay Primary/Torbay Primary School	Waiake Beach (RS)		X	X	
Waitotara Sustainable Living Group/Rodney Homeschool Group	Waiwera Beach (SS)		X		
Waiheke Primary School	Whakanewha Regional Park (RS)	X		X	
Total unique participants per year		8	10	8	7

* Collected data but did not participate in the project

** HGMP Project Co-ordinator assisted by team of experts (MPI, MERC, previous project co-ordinator)

DISCUSSION AND FUTURE RECCOMENDATIONS

Monitoring

The 2020 ‘State of the Gulf’ report celebrated the 20-year anniversary since the establishment of the Hauraki Gulf Marine Park. Unfortunately, this report also highlighted the declines of many valued species including crayfish/kōura, snapper/tāmure and various species of seabirds and sharks. Many other species the reside in the Hauraki Gulf do not have enough data available to assess that status of their populations.

Through regular environmental surveys that measure various ecological parameters – similar to the information gathered during Mm2 surveys – the overall health of the Gulf ecosystem can be monitored over time. Although not a replacement for the surveys completed by professional scientists, citizen science can complement these surveys by supplying broad-scale information that can in ‘fill in the blanks’. This is of particular relevance to large-scale, on-going monitoring – such as what is occurring in the Hauraki Gulf. Continued, routine monitoring will help managers better understand the natural and anthropogenic fluctuations in the Hauraki Gulf and so it is highly recommended that the HGMP continues in order to support the preservation and recovery of the Gulf.

This is particularly important for those locations that already have strong foundations of multi-year data already collected – some of which have found invasive species. The tracking of the spread of invasive species is also another reason to continue monitoring. Locations of where marine pests have be found is available on the Marine Biosecurity Porthole (https://www.marinebiosecurity.org.nz**),** maintained by Biosecurity New Zealand, and the Mm2 surveys could compliment this database well. Continued work with Biosecurity New Zealand is also recommended in order to further promote awareness of marine pests and the importance of marine biosecurity in the Hauraki Gulf.

Data Collection and Management

Given there was reduced sampling in 2020 (approximately half the amount of quadrats were surveyed), the species richness was still high and 113 unique species were identified (Fig 4). This could suggest that even if schools/community groups cannot commit to two data collection sessions, completing one data collection is still worthwhile. However having two data collections provides the opportunity for groups involved to collect and compare seasonal data and so it should still be encouraged that groups participated in multiple data collection sessions.

The Mm2 website is critical to this project as it is where the data is stored, provides simple data analysis tools and acts as a resource hub. Access to the data is important to support local ownership and encourage further investigations and stewardship projects. The data should be accessible not only to those involved in the HGMP but those who may be interested in the findings of this project. Further development of the website, resources could help support schools and community groups to dive in deeper and extend their involvement in long term monitoring. Improved report back process could involve schools creating local report cards about the health of their local shoreline.

Key to the future of the project is ensuring that the schools are not just donating their data but have a clear understanding of why they are collecting the data and how the data is relevant to them. It is critical that the students are involved in the analysis of the data over time and asking relevant questions. What is the data telling us about how the local environment is changing and how can we further investigate the cause of these changes.

Environmental Efficacy

Information gathered from the participating students shows that citizen science projects, such as the HGMP, are very important for encouraging environmental advocacy. In the word cloud, top words included "helpful" and "important" demonstrating the students' understanding that what they are doing is contributing to looking after their environment. Supporting this idea is the self-efficacy assessment which found that students felt they were confident students in assessing environmental concerns affecting the seashore at the end of the project.

The word cloud also highlights how much the students enjoyed participating in the project. "Cool", "fun", "amazing" were commonly used words by students. They also identified that this was a learning exercise which is shown by the presence of some words relating to education including "learning", biodiversity" and "thinking". This information supports the idea of the importance of hands-on and action focussed learning.

Participation in the Project

The growth in both the number of users and number of Mm2 surveys indicates that the active promotion of Mm2 through both Seaweek and the HGMP in these regions has been successful in creating interest and awareness of intertidal monitoring for these areas. Many teachers involved in this year's project had attended a workshop highlighting the importance of events to recruit new participants and upskill those already using Mm2.

All those involved in the 2020 year of the project are eager to participate in future years of the project. It is recommended that these schools are given priority as they have already shown commitment to the project and it would be good for them to fully participate in all six sessions of the project as originally proposed.

APPENDICES

Appendix 1a: Datasheet used for rocky shore survey

ROCKY SHORE

Mm2 SURVEY INFORMATION

NEW ZEALAND MARINE STUDIES CENTRE UNIVERSITY OF OTAGO

Date: _____ **School/group:** _____

Location: _____ **Surveyor names:** _____

Start Time: _____ _____

Shore Level: ☐Low ☐ Mid ☐High

Exposure: ☐ Very Exposed ☐ Exposed ☐ Sheltered

Substrate		Percentage cover %
Reef	*(stable rock cover)*	
Boulder	*(head size)*	
Cobble	*(fist size)*	
Gravel	*(marble size)*	
Sand	*(like the beach)*	
Sediment	*(fine grain size)*	
Mud	*(gloopy)*	
Total	***(should add to 100)***	**100 %**

Key Features of this Site *(e.g. rocky headland with surf beach 3 km to south; freshwater creek 50 m to the north; upper shore modified with harbour wall etc.).*

☐**Evidence of Human Influences** *(e.g. rubbish, people collecting seafood, tyre tracks on sand, dogs present, people in the water)*

☐**PHOTO:** Take a photo of your m^2 area and put the top of this sheet in the corner for identification later

If you find a species you cannot identify, write a description of it and where it was found in the species list. Make sure you take a photo of it and send all the information to us at marinemetresquared@gmail.com.

TURN THE PAGE OVER TO RECORD TYPES OF SEAWEEDS AND ANIMALS FOUND ➡

SEAWEEDS: common or scientific name	Percentage cover %	Total percentage cover %
Ex. Portobello seaweed	*1 + 20 + 2*	*23 %*

ANIMALS: common or scientific name	Species tally (count)	Total Count
Ex. Portobello Chiton	*𝍸 III*	*8*

Remember to enter your information on the Marine Metre Squared website: www.mm2.net.nz

Appendix 1b: Datasheet used for sandy shore survey

SANDY & MUDDY SHORE

Mm2 SURVEY INFORMATION

NEW ZEALAND MARINE STUDIES CENTRE UNIVERSITY OF OTAGO

Date: / / **School/Group:**

Location: **Surveyor Names:**

Start Time:

Shore Level: ☐ Low ☐ Mid ☐ High

Exposure: ☐ Very Exposed ☐ Exposed ☐ Sheltered ☐ Estuary (freshwater input)

Substrate		Percentage cover %
Reef	*(stable rock cover)*	
Boulder	*(head size)*	
Cobble	*(fist size)*	
Gravel	*(marble size)*	
Sand	*(like the beach)*	
Sediment	*(fine grain size)*	
Mud	*(gloopy)*	
Total	**(should add up to 100)**	**100 %**

Key Features of this Site *(e.g. rocky headland with surf beach 3 km to south; freshwater creek 50 m to the north; upper shore modified with harbour wall etc.)*

☐ **Evidence of Human Influences** *(e.g. rubbish, people collecting seafood, tyre tracks on sand, dogs present, people in the water).*

☐ **PHOTO:** Take a photo of your m^2 area and put the top of this sheet in the corner for identification later!

Surface feature	**Present? (√)**
Holes *(burrow entrance of shrimp, crabs, amphipods or clams)*	
Worm deposits *(e.g. poo of bamboo or lugworms)*	
Feeding marks (Wedge shells or snail trails)	
Other (describe)	

TURN THE PAGE OVER TO RECORD TYPES OF SEAWEEDS AND ANIMALS FOUND ➡

Surface count (in 1m x 1m quadrat):

Record plants and seaweeds as a percentage (%) cover. Count only live animals.

Plants, Seaweeds, Diatoms: common or scientific name	**% Cover**	**Total % Cover**

Live Animals: common or scientific name	**Species Tally (Count)**	**Total Count**

RPD Levels and Infauna Counts (in 10cm x 10cm core):

Take four core samples (one from each corner inside your m^2). Remember to move surface life out of the way so it is not counted twice. Slide sediment out of the core carefully. Measure from the surface to where the sediment changes colour (this is your RPD level). Place the sediment in the sieve, rinse, and count the animals living in the mud (infauna).

RPD Level	**Core samples taken from inside your quadrat**				
(in mm from surface)	**1**	**2**	**3**	**4**	
Infauna Count	**Core samples taken from inside your quadrat**				**Total animals**
(Common or Scientific Name)	**1**	**2**	**3**	**4**	**in 4 cores**
Ex. Portobello Cockle	***4***	***3***	***0***	***6***	***13***

If you find a species you cannot identify, write a description of it and where it was found in the species list. Make sure you take a photo of it and send all the information to us at marinemetresquared@gmail.com.

Remember to enter your information on the Marine Metre Squared website: www.mm2.net.nz

Appendix 2: Exemplars of newsletter and Facebook interactions with content relevant to the HGMP

	Topic of Newsletter	Date Posted	Total Views	Social Media Engagement (people reached, likes/shares)	URL
1	Is your habitat healthy?	14/08/20	434	63 people reached, 2 engagements	https://mailchi.mp/mm2/is-your-habitat-healthy
2	Intertidal Invaders	25/09/20	480	92 people reached, 8 engagements	https://mailchi.mp/mm2/intertidal-invaders-mm2-newsletter-sept-2020
3	Hauraki Gulf Monitoring Project	16/11/20	445	332 people reached, 15 engagements	https://mailchi.mp/mm2/hauraki-gulf-monitoring-project

	Facebook Post Subject	Date Posted	Social Media Engagement (people reached, likes/shares)	URL
1	Video of grey-gilled sea slug	16/09/20	1847 people reached, 315 engagements	https://www.facebook.com/marinemetre2/videos/606941683318489/
2	AGE school HGMP data collection	16/09/20	88 people reached, 11 engagements	https://www.facebook.com/marinemetre2/posts/1716298311860529
3	Wentworth College and Primary HGMP data collection	18/09/20	162 people reached, 35 engagements	https://www.facebook.com/marinemetre2/posts/1718431578313869
4	Waiheke Primary School HGMP data collection	25/09/20	474 people reached, 171 engagements	https://www.facebook.com/marinemetre2/posts/1725453770944983
5	Auckland Council Biosecurity video	29/09/20	107 people reached, 5 engagements	https://www.facebook.com/marinemetre2/posts/1729554747201552
6	Te Atatū Intermediate HGMP data collection	17/11/20	530 people reached, 28 engagements	https://www.facebook.com/marinemetre2/posts/1776145302542496

Appendix 3: Survey provided to teachers as part of the teacher/leader evaluation for the HGMP 2020

1. School / Group Name

2. Level of participating students

3. Did the programme enable you to extend student learning and understanding beyond what is possible in the classroom? (Y/N)
Comments

4. What were the strengths of the programme? (tick all that apply)
Participation in an authentic science research project
Exploration of local natural environment
Use of scientific equipment / resources
Linkages between scientists and the wider community
Hands-on nature of the programme
Links to the *Nature of Science* curriculum
Science expertise of staff
Staff passion / teaching skills
supports environmental action and stewardship
Other (please specify)

5. Please rate the following experiences (please select N/A if not experienced)
(no value, valuable, very valuable, N/A)

	no value	valuable	very valuable	N/A
Communication about the project				
Project resources				
Data collection / seashore field trip				
Data analysis / summary classroom session				

6. Have the students increased their understanding of the Nature of Science? (Y/N)

7. If yes, identify which Nature of Science (NOS) objectives were supported during the programme. Please give observed examples of how they were supported.
Investigating in science:
Understanding about science:
Communicating in science:
Participating and contributing:

8. Did your students understand the importance of collecting baseline data about the intertidal community? (Y/N)
Comments

9. How could the programme have been improved? Please enter N/A if no comment.

10. Do you have any ideas for how this project could be extended or further developed to support student learning?

11. Overall how would you describe the value of this programme?

No value for the students
Limited value for the students
Valuable for the students
Very valuable for the students

12. How did the topic link with your current school theme or inquiry unit?

13. As a teacher, what aspects of the programme were beneficial for your own learning?

14. Are there further comments that you would like to make about the programme / visit?
Programme:
Staff:
Other:

15. Have you particpated before in the Hauraki Gulf Monitoring Project (Y/N)
Comment

16. Would you be interested in participating in this project in 2021? (Y/N)
Comment

Appendix 4: Self-efficacy survey (and other short answer questions) provided to participating students in the HGMP 2020

School Name: _____ Year Level: _____

Please answer the following questions. Your answers will be anonymous.

1. How could you describe the Hauraki Gulf Monitoring Project (HGMP) in three words?

1._____

2._____

3._____

2. Describe why you would like to continue monitoring the Hauraki Gulf in the future

_____

_____

_____

_____

_____

3. What is the most important thing you have learned during the project?

_____

_____

_____

_____

Please turn over to continue the survey

Please indicate how much you **DISAGREE** or **AGREE** with each of the following statements by circling the number in the appropriate column. Please respond as you really feel, rather than how you think "most people" feel.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel confident in my ability to help protect the local seashore environment	1	2	3	4	5
2. I am capable of making a positive impact on the local seashore environment	1	2	3	4	5
3. I am able to help take care of the local seashore environment	1	2	3	4	5
4. I believe I can contribute to solutions to local environmental problems by my actions.	1	2	3	4	5
5. Compared to other people, I think I can make a positive impact on local environment	1	2	3	4	5
6. I don't think I can make any difference in solving local environmental problems.	1	2	3	4	5
7. I believe that I personally, working with others, can help solve local environment issues.	1	2	3	4	5
8. It's hard for me to imagine myself helping to protect the local seashore environment	1	2	3	4	5