MAKETU ONGATORO WETLAND SOCIETY

ANNUAL REPORT

2020

Contents

Introduction from the Chair

Like everyone else, MOWS was significantly affected by COVID-19 restrictions, but fortunately the virus has not had any serious implications for our work. We had to stop all activities during Lockdown, but our traps were still operating, so that when we checked them under Level 3, they had a rather bigger haul than normal. Also, autumn is not a time for strong weed growth, so while there was a hiccup, by the end of June we were back on top of most of our projects and contracts.

The year has though been ne with significant changes for MOWS, particularly among our team of workers and volunteers. By the end of 2020 we will have lost five of the team, not because they have retired or been overworked, but because they have moved away. We were always aware that this was a potential danger, Maketu is a small community and one of the reasons we went down the social enterprise route was that our pool of volunteers was quite limited, especially when you look at the size of the task around us.

Our response to this major change was to look to develop a professional team of people who would be employed by MOWS and we made the decision, with the support of our funding partners, to take on our first employee, Laura Rae, who has been working with us as a contractor for the past couple of years. We have also just employed a trainee to work with Laura.

The year also saw the expiry of our Biodiversity Management Plans for Maketu Spit and Waihi Harbour WMR. These have now been replaced, with somewhat improved funding, by two new Environmental Programmes which will also run for five years. Our thanks to our partners at Bay of Plenty Regional Council, Western Bay of Plenty Regional Council, and the Department of Conservation for agreeing to these new plans.

During the year we upgraded the storage facility at our Wilson Road Shed. We initially erected a small 3 m x 2 m container alongside the main shed to store our fuel and chemicals. However, new regulations meant that we could not keep the fuel and chemicals together, so we fundraised to purchase another container to store the fuel. Given the amount of gear and materials that we are accumulating, I can see the need for yet another shed in the not too distant future!

One problem we have had to deal with is the number of changes to our Team. During the year, Nick Webb, Steven Wright and Jamie Moko both moved away, Will Anaru has a full-time job, so is much less involved, and next year Tania Bramley is moving out of the area. Our thanks to those who have moved on for all the support they have given, we will keep you posted on the challenges that face us.

Overall, the year has been extremely successful, with our Education Programme going from strength to strength. We will miss Tania when she moves away! My thanks to all the many people who have come together to make MOWS the success that it is. The challenge now is to maintain and expand that work.

Julian Fitter

Chair
Maketu, October 2020.

Biodiversity Management Plans – Overview

This year we were running two Biodiversity Management Plans (BMPs) and two Environment Plans (EPs), there is no significance difference between the two terms. As with everyone our work was somewhat affected by the COVID-19 lockdown, but overall, we have made excellent progress and certainly the shorebird breeding success continues to impress.

Maketu Spit Year 10

This was the tenth year of this BMP and we made good progress on all fronts. We had the driest start to the year on record with only 209 mm of rain falling in the first five months of the year, followed by the wettest June on record with 291 mm. However, the native vegetation survived the shock with no obvious mortalities. On July 7th 2020, we had a mini tornado which nearly destroyed a native Five Finger plant *(Pseudopanax arboreus*), and did destroy a maimai on the estuary margin.

Aftermath of mini-tornado on Maketu Spit.

Pest Plants

This, as I have said before, is a never-ending battle. No sooner do you get on top of one pesky weed, then another appears. This year we finally removed the last three wildling pines - the big ones are relatively easy, but the small one near the top of the dune was quite tough, it effectively had no trunk, so we had to cut a trail into it to get at the root. The focus of our other weed control work is twofold, alien grasses, of which here are a number, and herbaceous and shrubby weeds.

Herbaceous and Shrubby Weeds

There are a number of species in this category. Italian buckthorn *Rhamnus alaternus* is one which is adept at hiding in the dense stands of Wiwi *Juncus edgariae*, and lupin *Lupinus arboreus*, which do not hide at all but whose seeds are amazingly resilient and new plants keep re-appearing even though no plants have flowered in the area for several years. We have a strong focus on removing velvet groundsel *Senecio elegans*, and are starting to target gravel groundsel *Senecio skirrhodon*, which is spreading westward up the spit. Another problem weed is turnip *Brassica rapa*, which seems to love the spit, it often grows close to the gull colony and is hard to control once the gulls are in residence.

Grasses

Of the alien grasses, we seem to have a new one with a very large broad leaf, which is mainly found close to the gull colony, in fact the colony is quite a problem because the gulls bring back seeds on their feathers and on their feet, and also fertilize the area, making it that much better for growing. We spray the grasses and weeds around the colony in August but cannot get back there until January or February to remove any new growth. The main focus of the alien grass control is in the western end, where we have large areas of *Muehlenbeckia axillaris* which are constantly being invaded by tall fescue grass *Festuca arundinacea* and Kikuyu *Pennisetum clandestinum* the former grows up through the Muehlenbeckia and gradually pushes it out, the latter grows over it and smothers it. Muehlenbeckia is a key species for invertebrate and reptiles so it is important that we maintain good control.

Pest plant control is ongoing throughout the year, but somewhat regulated by the weather. Ideally, we would increase our efforts in spring when plant growth is strong, but the weather often has other ideas. In autumn when it is much calmer, the weeds are not as rampant.

Spit Profile Monitoring

This year we continued with our quarterly monitoring programme, this was somewhat disrupted by COVID-19, but is now back on track.

Working bees

Our working bee schedule was pushed back a few months this year due to lockdown requirements. But we still managed to hold two working bees at Maketu Spit. In June, we held a clean up and planted some Pingao *Ficinia spiralis* in the fore dune near the car park. In September, Coast Care Bay of Plenty organised an estuary margin planting day. Now that the causeways to Papahikahawai Island have been removed, the estuary margin is much healthier and the water salinity is more stable. This allows a wider range of estuary margin shrubs and rushes to establish. It was great to meet some keen new volunteers at both events.

Maketu spit working bee in September.

Dotterel Point, Pukehina – Year 7

Dotterel Point is a very satisfying project, because we can see the amazing growth of the dune as a result of our semi-permanent fence. This year it has been very 'semi' as we have seen a lot of erosion on the inside of the spit. We relocated the posts at the end of 2019, but by the middle of 2020, they had all been eroded again, plus a few more. On the other hand, at the eastern end of the fence, where it abuts the old dune, the problem is the reverse and the posts are disappearing into the sand – a good result in one sense, but also a lot of work to dig them out! In previous years, as the dune built, there were three gaps where the waves were able to flow through during storms, two of these have now closed and the third, and largest one, is significantly higher that it was before.

Pest Plant Control

The construction of the effluent field for the new Surf Club sewage system has presented a significant weed issue. Bermuda buttercup *Oxalis pes-caprae,* a noxious weed was difficult to manage and remove, causing minor collateral damage. Further along Dotterel Point, an invasive grass problem is developing, but we will need to focus more on this in the future. Muehlenbeckia normally survives pretty well, though we know that Kikuyu and tall Fescue grass cause problems. The main problems within the fence are Yucca, where bits of tuber get washed ashore and buried making it difficult to locate. Dimorphotheca is an ongoing problem as is Montbretia along the estuary margin, however both are controllable. We failed to remove any more Norfolk Pines this year, but they are still a target species as they disrupt the natural ecosystem, which is recovering well.

Erosion

This is a constant at Dotterel Point but there are signs that the erosion on the harbour side, east of the dotterel area, is slowing. There are still a couple of Pohutukawa *Metrosideros excelsa* hanging on, but they now occur a metre or more above the beach. We did a modest amount of planting quite late in the season with Coast Care BOP and Rotorua Girl Guides to see if we could build on the natural process. Next year will tell!

Newdicks Beach - Year 6

We had a very busy planting year in 2019. So, the primary focus this year was ensuring that those plants were regularly maintained to ensure they established well. Ngaio *Myoporum laetum* seem to have the best success rate at Newdicks beach, there is a pesky goat who grazes on the cliffs and he loves Taupata *Coprosma repens*, but Ngaio is toxic to animals. We managed to source ten healthy Pohutukawa trees which have been planted along the bank zone. The Pines on the slope above the beach are an ongoing target which we have been gradually removing. We plan to cut down a couple more this spring.

Working bees

We held one working bee in collaboration with Coast Care BOP at the Little Waihi end of Newdicks Beach, replanting Native Pingao and Spinifex where erosion has been gradually occurring as a result of a large storm surge in 2017. We had a great turn out with 22 enthusiastic volunteers working to help achieve our goals in conservation.

One of our Education team members Janie Stevenson with one of last year's dune posters in foreground.

Waihi Harbour Wildlife Management Reserve - West – Year 6

This is another very rewarding project, it has come such a long way, but also has a long way to go. It is particularly rewarding to see the growth of the vegetation, all of which we planted, and very special indeed to have Bellbird *Athornis melanura* recorded there by Tim Barnard. This is a real success as it shows that we really are starting to rebuild the ecosystem and restore some of the mauri of the area.

Birds

One of the key reasons for improving the ecosystem here is to improve the bird life. While the sighting of a Bellbird is great news, the main focus continues to be around the preservation of waterfowl and wetland birds. Our flock of Royal spoonbill *Platalea regia* has become a regular feature with approximately 40 birds present, often in the wetland area, at other times out in the harbour. They also display filoplumes in the

spring, which suggests that they may be breeding. This would tie in with the fact that numbers around the bay appear to be on the increase, we also only discovered recently that they do not always nest in trees, but often on the ground and in Raupo *Typha orientalis* of which we have quite a lot. So, this coming spring we will investigate if they are breeding and report back next year.

In October, DOC conducted survey of Bittern *Botaurus poiciloptilus* (threatened; nationally critical), this involved having many observers/listeners stationed strategically around the wetland at dusk. During the spring/mating season, male Bittern emit a low booming call which because of its low frequency travels a great distance. We have not seen the results of the survey which covered Tauranga Harbour and the Kaituna WMR, but the Waihi Harbour has at least 2 breeding pairs, so can be described as a Bittern hotspot. We observe them quite frequently, but they tend to fly off as soon as they are aware of your presence.

Another sign of the improved ecosystem is the presence of two small marsh birds; Banded rail *Gallirallus philippensis* and Spotless crake *Porzana tabuensis*. Both species are at risk and declining, they are very secretive and not often seen. In June a Banded rail was observed at the eastern end of the harbour. In addition, two Spotless crakes were seen in the wetland area, one flew across the bonnet of the truck. These increased sightings of native birds in the area further validate the importance of preserving these ecosystems through conservation work and pest control management.

Planting

Restoration work along the Wharere and Kaikokupu streams is a working progress, however, the majority of the banks have been planted with natives and some infill work remains to be completed in some areas. The plants have successfully established themselves and continue to grow. This year, restoration work was focused on the west bank of Pongakawa, working from the harbour end. Karl McCarthy (DOC) kindly organised the felling of a number of large Wattles, which opened new areas that we could plant in natives. Ongoing monitoring of these areas will continue to ensure replanting efforts are making positive progress.

More exciting though was our first plantings of Ririwaka *Bolboschoenus fluviatalis,* a species of swamp Bull rush. We have quite a serious erosion problem at the mouth of the Pongakawa Stream, we have lost at least 1m on the west and 2m on the east, and it is continuing. While some damage may be attributed to white-baiters, they do not use the western bank, so cannot be at fault there. To try and solve the problem we planted *Bolboschoenus*, it has corms and spreads underground. It dies down over winter and shoots up in the spring, the dead stems provide some protection over winter, but the real benefit comes from the root structure holding the sediments together and hopefully preventing further erosion. First signs are that it is working well, and we will be planting more this year and in subsequent years, to stabilize and maybe build back the banks.

Bright green Bolboschoenus fluviatalis growing along bank of Pongakawa Stream.

Pest Plant Control

In the beginning, invasive Pampas, a very invasive grass, was a major concern in most of the reserve but this is now a minor issue apart from in the enclosed freshwater wetland area. We are able to access around 60% of this area on foot, but the other 40% is wet and access is restricted by drains. To overcome this, we arranged additional funding for a helicopter spray. We had done a Helispray back in 2016 to remove the bulk of the Pampas in the wetland area, but some inevitably survived, and others were new plants that keep-a-coming. So, this time, we targeted individual plants, and as you can see from the photo below the pilot had to hover very close to the ground and hit individual plants using a nozzle at the end of a long spray boom. I gather that flying close to the ground is a great deal harder that flying at altitude, so many thanks to our ace pilot, David Lealand, for doing such a fantastic job. We also targeted a small number of Pampas in the eastern part of the reserve, and the sea couch *Agropyron pungens* along the harbour margin.

Sea couch is a major problem in Waihi Harbour, and we have been working on it for the last five years. One problem is the perennial one of needing to spray in the spring when the weather is generally less favourable, and in addition, most of it needs the right tide, so if the tide is wrong when the weather is right, or vice versa, it can be hard to find a good time to do the job. In time it will be gone.

However, while we are making good progress with Pampas and sea couch, two 'new' weeds are causing trouble, Cow cress and Glyceria. Cow cress or Fools cress *Apium nodiflorum* is an extremely vigorous annual that creates large patches extending well out into the stream, and if allowed to develop in drains it acts as an effective block. Our key objective in dealing with it is to prevent it becoming well established in the freshwater wetland.

Flying low - David Lealand targeting individual pampas plants

Glyceria maxima is a large, vigorous, perennial and very invasive grass. It builds dense mats along the river banks, extending several metres out into the stream. It also spreads inland and into the wetland where if permitted, could likely takeover completely. A good example can be seen at the Affco meat plant in Waitangi where two of their treatment ponds are completely choked with a dense and exclusive mass of Glyceria. This year we started removing it, mainly on the Pongakawa Stream, and are planning to deal with the Kaikokupu and Wharere streams as well. Though of course as with all of these weeds, follow-up is essential. We then need to tackle the Glyceria that is invading the wetland, but to do that we also have to deal with the willows.

Pesky Wasps

While dealing with Glyceria, we also had a potentially serious incident. Laura was out spraying and disturbed a nest of common wasps *Vespula vulgaris*, they are pretty nasty critters when they work together and she got a significant number of stings. She also had to leave the backpack sprayer behind. Julian went to locate it, which he did, and even though he was aware of the nest, he still trod on it – it was in a dead pampas stool beside a drain, with the entrance on the drain side, and not visible. He too received an unpleasant reception, so we called in the specialist and destroyed the nest. This is only the second time in 12 years of operation that we have come across this problem, the first one was in Whakapoukorero and was fairly easy to deal with, this one was much larger and difficult to spot. We have now added wasps to our H&S hazard list.

Planting

Over 100 people, including students from Fairhaven School and staff from ANZ Bank along with the local community, helped plant more than 2000 native plants that were generously donated by the Bay of Plenty Regional Council – BOPRC - on the stop bank leading to Waihi WMR. The event was organized by MOWS in collaboration with Sustainable Coastlines as part of their 'Love Your Water Tour 2020'.

Volunteers planting up the access stop-bank running down to the reserve.

Water Levels

Last year, Karl McCarthy (DOC) and John Meikle (Eastern Fish & Game) fixed the weir that controls the water levels in the freshwater wetland area. Originally the flapgate on the culvert prevented water from flowing into the wetland as it was designed to allow the area to be farmed. Now however, we have a fish-friendly device on the gate which allows water to flow in during a rising tide, and then shuts. Now that the weir does not leak, we have more control in managing base levels which is then topped up by rainfall. We can still close the gate and in doing so, lower the water level to improve foot access to that area.

Waihi Harbour Wildlife Management Reserve Wetland - East

The eastern side of the reserve is developing quite nicely, MOWS work there involves mowing now to keep the track open, trapping using DOC 200s, and weed control. This year we also began skink monitoring, and added a new pest species, the plague or rainbow skink *Lampropholis delicata*, an Australian import which drives out the natives. We did some trapping to reduce numbers and also found a couple of nests – one underneath a DOC 200. All of New Zealand's native skinks are viviparous, but introduced skinks are oviparous and lay soft-shelled eggs. We plan to continue this work this year to keep numbers down.

Pest Plant Control

The main pest here is Pampas, but it is all new fairly small plants and so relatively easy to control. There is also still quite a bit of sea couch on the saltmarsh side of the bund. We also have some Inkweed, a modest amount of blackberry, the odd Boneseed and a few Wattle. The nice feature here, is that while we are not planting any native plants, the stop-bank is gradually repopulating with natives, mainly Rushes and Bracken, but Ti Kouka or Cabbage tree *Cordyline australis* and Harakeke flax are appearing, additionally one or two white-baiters have planted flax around their stands. This is obviously the best way to allow nature to take over, that way, whatever native grows there is clearly well adapted to the location. The last of the Pampas in the saltmarsh was dealt with this year using the helispray, as was the sea couch along the harbour margin.

Te Huauri O Te Kawa Wetland, Kaituna River

This is a Maketu Taiapure project, MOWS has been contracted to do the practical work. Originally known as the 'Borrow Pits', this site then developed into the By deLay Wetland, and has now matured into the Te Hauari o Kawa Wetland. There will be a renaming ceremony but we are hoping to get some funding from the Regional Council EEF for a length of boardwalk over a marshy area before this, so the event is likely to happen in 2021, but we have erected some new signage.

We held our first education wetland trip with Laura as the new manager with Maketu Kura. Awesome day, the kids learnt a few new things to help alongside their whitebait study project. We caught a huge long fin tuna in the ponds with the hinaki (fish trap) that we had set the night before. We also had another lot of school kids come through who helped get some left over plants planted and then had a wetland tour.

One of the major problems in the ponds is the growth of water weeds, especially oxygen weed *Lagarosiphon major*, which if left unchecked will completely choke the ponds and waterways. This year we are trying a new system, floating wetlands, these help to restrict weed growth and provide good shade for fish life. The units are made of plastic and then planted with suitable plants, *carex secta* a sedge and various rushes. These also help to clean the water of nitrates and phosphates, after planting they are anchored to the bottom. After a trial, we held a couple of working bees to take the mature plants from the ponttons and plant them on the pond banks. We then replaced the plants in the pontoon with new young ones.

Top photo: Floating treatment wetland ponttons with mature plants. Bottom: Floating treatment wetlands following working bee with Fairhaven School on the Wild About NZ programme.

Due to the Covid19 lockdown we missed the inanga spawning season this year. We have noticed a decrease in the amount of whitebait coming up river, whether this is just an annual variation, or the sign of a bigger problem is hard to tell right now. Will Anaru who runs the Catfish-killa programme in the Rotorua lakes, kindly donated a catfish net, it is important to know if these pest fish spread this far. So far we have not had to use it.

The erosion along the river bank is still occurring throughout the year, most likely caused by boat wash. To help slow this we have planted a number of willow poles they have all taken really well. Our primary focus has been on maintaining the track and controlling the weeds, the main culprits are pampas, gorse blackberry and honeysuckle, as with most weed control it is an ongoing and long-term issues, but we are gradually getting on top of them.

We installed new bridges for better and safer access throughout the wetland. They are a great improvement on the planks we had in place before and are essential given the number of schoolchildren visiting the site. We have had a few problems with the lock on nether new stopbank gate being cut. Sadly a small number of people continue to show a lack of respect for the environment and the work that we do.

Biodiversity Monitoring

Moniqua Nelson-Tunley has been conducting the plant, skink and invertebrate aspect of biodiversity monitoring for MOWS since 2014 but travelling from the Waikato to help with our monitoring has become a bit too much and she has decided to move on. Many thanks to Moniqua for all her amazing help over the past few years – we wish you the best.

In April, Jenn Sheppard took up the role of Biodiversity Officer. Jenn is an ecologist and started Simax Ecology after completing her PhD with Auckland University in 2017. She specialises in avian reproductive ecology but has a diverse skill set that includes bird monitoring and ecological surveying. Jenn has been helping with bird monitoring and has been part of the education team since 2018.
This past winter, Jenn also began sorting the copious amount of data that MOWS has collected since 2008 including the biodiversity data but also information on bird monitoring, photo points, trapping, water quality monitoring (with the education programme) and planting. Over the upcoming months, Jenn will be

developing a database where all the information is stored. This will enable us to run more in-depth statistics, look for patterns among various activities (i.e., simultaneously compare trapping to biodiversity) and will make it easier to prepare and share information with Councils, DOC and the public.
Presently, Jenn is busy shifting through the plethora of information that MOWS has gathered over the past decade so unfortunately, we don't have a huge amount of detailed results available at this time but we are still able to provide a brief update about ongoing biodiversity monitoring.

Shorebird monitoring

MOWS began counting birds during the breeding season at Maketu Spit in 2009 and at Dotterel Point, Pukehina in 2011. These have normally been conducted by Julian, but in 2018 Jenn joined in and the load is now shared. Surveys usually begin in late August or early September and are conducted around every two weeks until late January/February. Often, the number of surveys is dependent on the availability and scheduling of staff as well as weather and tide schedules. Surveys are normally done at or around high tide to ensure a degree of consistency. On average, 12 counts are completed each year.

During these counts, the number of every bird observed is counted but the primary focus is on northern NZ dotterel (*Charadrius obscurus;* endemic; recovering) and variable oystercatchers (*Haematopus unicolor;* endemic; recovering). At Maketu Spit, gulls and terns also nest, so red-billed gulls (*Larus novaeholliandiae;* native; declining), black-billed gulls (*L. bulleri*; endemic; nationally critical) and white-fronted terns (*Sterna striata*; native; declining) are also our main interest there.

Northern NZ dotterel (top left), variable oystercatchers (top right) and a mix of black-billed gulls (centre of photo bottom) and red-billed gulls (bottom photo) at Maketu Spit. Photo credits: Simon Allard.

Once the bird data is collated and organised into the database, Jenn is able to analyse the data and present some nice results. At the moment, only data for Maketu surveys has been organised, so we will need to wait a few months before Dotterel Point results are ready. Using the number of birds sighted during each count, relative abundance of a given species can be calculated for each breeding season as:

$$annaul\ abundance = \frac{\sum(number\ of\ birds\ per\ survey\ per\ year)}{total\ number\ of\ surveys\ each\ year}$$

Relative abundance describes how species are representative throughout a given area and allows for a comparable index of each species between sites and overtime. Estimates of relative abundance show that since 2009 the number of variable oystercatcher and northern NZ dotterel has increased (**Error! Reference source not found.**).

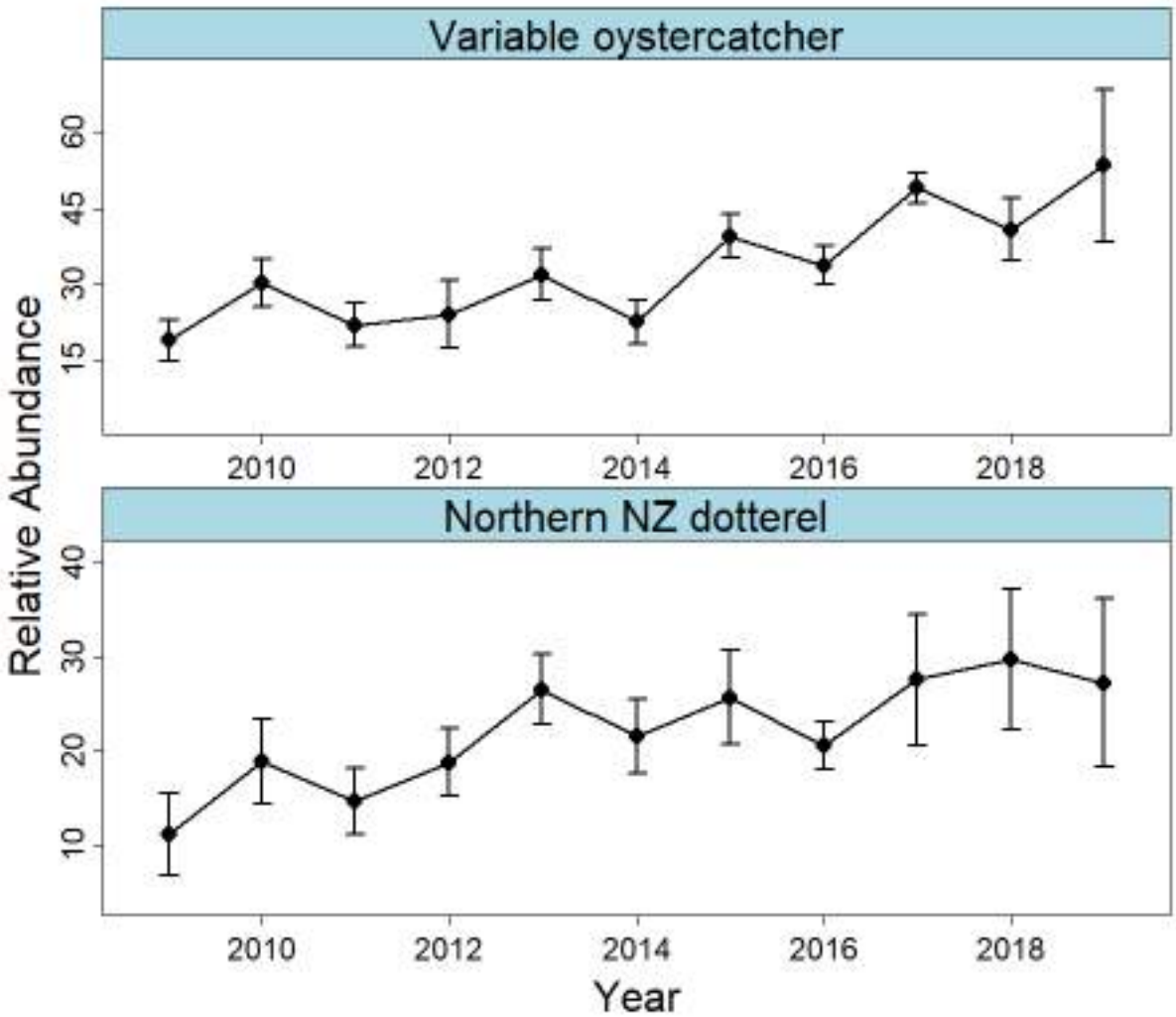

Figure 1 - Relative abundance of variable oystercatcher (top graph) and northern NZ dotterel (bottom graph) for each breeding season at Maketu Spit, showing upper and lower 95% confidence intervals.

Of course, in 2011 the Rena ran aground, so counts from that year are circumstantial as several birds were removed from the spit as a precautionary measure to prevent oiling. Overall, trends between variable oystercatchers and northern NZ dotterel seem similar such that increases and decreases of both species occur simultaneously in the same breeding season. A more in-depth analysis is underway to explore how statistically different these changes may be and to investigate potential causes of the fluctuating numbers observed.

The number of red-billed gulls and black-backed gulls have also increased over the past decade, while the number of white-fronted terns has fluctuated on a yearly basis (**Error! Reference source not found.**). Fluctuating tern numbers are likely a result of storms that have wiped out most of the nests in a given year, which often results in fewer breeding birds in the following year.

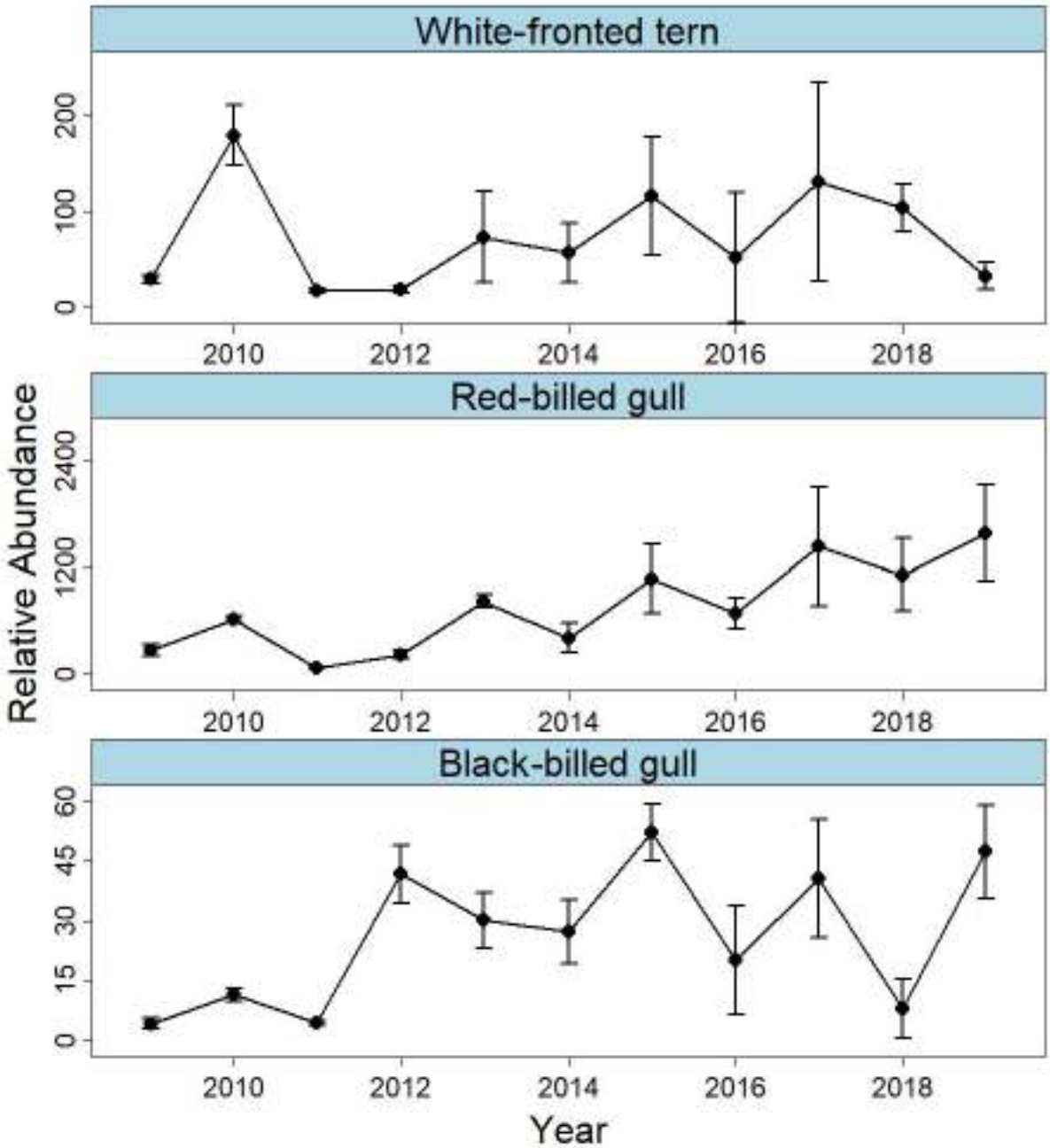

Figure 2 - Relative abundance of white-fronted tern (top graph), red-billed gull (middle graph) and black-billed gull (bottom graph) for each breeding season at Maketu Spit, showing upper and lower confidence intervals.

Going forward, Jenn may be able to investigate how the relative abundance of these birds has changed in response to restoration activities (e.g., pest trapping and plant pest spraying) undertaken by MOWS. Of course, Dotterel, Oystercatchers, Terns and Gulls are not the only species recorded during bird surveys, but these are the main birds that breed in the area. Other birds such as Spur-winged plover (*Vanellus miles*; native; not threatened) and Southern black-backed gulls (*L. dominicanus*; native; not threatened) also nest in the area, while migrating birds such as Bar-tailed godwit (*Limosa lapponica*; native; declining) and Red knot (*Calidris canuts;* native; nationally vulnerable) tend to congregate in flocks during our summers. Again, once all the bird data is finally sorted and organised into the database, Jenn will be able to estimate species richness and diversity for each year for both Maketu Spit and Dotterel Point.

Reptile Monitoring

Reptiles monitoring was last undertaken in December 2019 and is scheduled again in late November and February 2021. Typically, reptiles are trapped at the beginning and end of summer but due to personnel changes trapping was not undertaken in February 2020.

To capture reptiles, pit fall traps are set for three consecutive nights at Dotterel Point, Maketu Spit, and Newdicks Beach (Waihi East and West were trapped once in summer 2016/2017). Once captured, weight, measurements and photos for identification are taken. Photos are used to determine if an individual has been recaptured based on the pattern of their scales on the head (**Error! Reference source not found.**3).

Figure 3 - A) skink in pitfall trap, B) holding skink to take photos for identifications of recaptures

In December 2019, a total of 13 skinks were captured including 4 at Dotterel Point, 1 at Newdicks Beach and 8 at Maketu Spit. None of the skinks were recaptured from previous years and all were shore skinks (*Oligosoma smithi;* endemic; non-threatened). Moko skink (*O. moco*; endemic; sparse) have not been detected since 2016 and non-native rainbow/plague skinks were detected once in 2015. Last years' capture rate was the lowest catch rate at Maketu Spit to date (**Error! Reference source not found.**4). It was also among the lowest number of skinks captured at Dotterel Point and Newdicks Beach.

The perceived decline in skinks may be attributed to predation, changes in vegetation or the development of trap aversion or shyness (i.e., skinks are no longer willing to go into traps). To test the later theory, we will slightly shift the trap locations in hopes of increasing the catch rate this year. If numbers are still down after Feb 2021 then immediate action will need to be taken to understand the causes of this decline and to help protect this species.

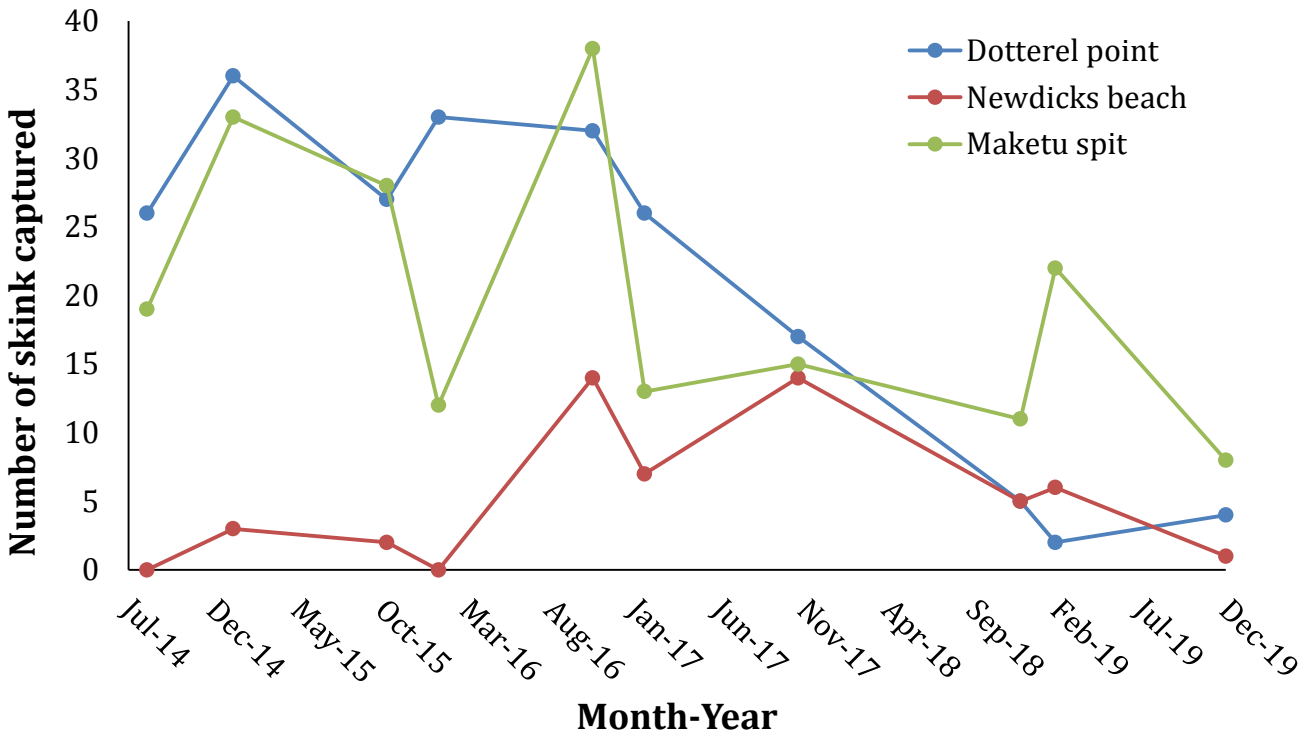

Figure 4 - Total number of skinks captured at Dotterel Point, Maketu Spit and Newdick's Beach since July 2014.

Going forward, Jenn will undertake more in-depth analysis on the skinks that have been captured since 2014. She will incorporate recapture information, conduct a mark-recapture analysis and produce population estimates. If time permits, she is also interested in investigating how biometric information (e.g., body size measurements) differs between the different locations.

Terrestrial invertebrate monitoring

Invertebrate monitoring was once again undertaken at Dotterel Point and Newdicks beach in Dec 2018 and Mar 2019 (beginning and end of summer). Monitoring at Maketu Spit and Waihi East and West is scheduled for Dec 2020 and Mar 2021. Invertebrate monitoring is conducted every 5 years.

To capture terrestrial invertebrates, we set two lines of 15 pit falls where one line is located in the fore-dune and the other in the back-dune. Traps are filled with glycol (antifreeze) to help preserve specimens and a stick is placed in each trap to allow reptiles to escape. Traps remain set for 14 days. Once they are retrieved, samples are stored in isopropyl alcohol until they can be processed. Processing involves counting the number of individual organisms and identifying them as a 'representative taxonomic unit' (RTU). Identifying invertebrates to species level can be quite challenging and often requires the skill of a professional entomologist who specialises with the family or order of a given species (such as beetles). MOWS staff do not have that skill, so instead we group them into RTU's and simply determine if beetle A is different from beetle B and so forth. Needless to say, processing and counting the samples is time consuming and we are still processing samples collected at Pukehina and Newdicks Beach. However, both Jenn and Claire Hartley will be working hard over the upcoming months to get these organised and identified.

Invertebrate monitoring has been ongoing since April 2015 and 121 RTU's have been identified. Many of these are beetles, flies and spiders but we've also found many other species including cockroaches, millipedes, centipedes, mites, worms, bees, wasps, shield bugs, harvestmen, ants, pseudoscorpions, and snails (**Error! Reference source not found.** 5).

Figure 5 – Left; Millipede and Right; Mites collected from pit fall traps during invert monitoring

By counting the number of individual organisms and RTU's we can obtain estimates of species richness (number of species per site) and species diversity (a measure of the number of different species and relative abundance of those species). Going forward, Jenn will investigate how species richness and diversity differs between the different locations and whether there are any stark differences between the last round of monitoring (Apr 2015–Apr 2017) and monitoring that is currently in progress.

Vegetation monitoring

The next round of vegetation monitoring is scheduled for February 2021. To measure vegetation, we use modified Reece plots (measuring 5 x 50 m) and record the abundance and hight-tier of each species. In future surveys, we will also use rapid-point count transect surveys, where the height and species of the most dominant plant is recorded in 1 m increments along a 50–100 m transect.

Currently, vegetation is measured along 12 vegetation plots (3 at Dotterel Point, 6 at Maketu Spit and 3 at Newdicks Beach). Since 2015, 33 REECE surveys have been collected including 11 at Dotterel Point, 13 at Maketu Spit and 10 at Newdicks Beach. To date, 57 plant species have been recorded, including three unidentified species and one type of grass which was not identified to species. Species richness is defined as the total number of species in a given site, and is greatest at Dotterel Point (**Error! Reference source not found.**). Initially, around half of the plant species detected were exotic but these numbers appear to be decreasing over time while the number of native and endemic species are increasing or remaining stable (**Error! Reference source not found.**6). These results are based on a simple preliminary analysis, but going forward Jenn will undertake a more in-depth analysis to determine how plant communities and the abundance (or absence) of certain plant species has changed.

Table 1 - The total number of exotics, endemic and native plant species recorded at each location during vegetation surveys since 2015.

	Exotic	Endemic	Native	Total Species Richness
Dotterel Point	18	8	10	36
Maketu Spit	16	5	10	31
Newdicks Beach	17	2	8	27

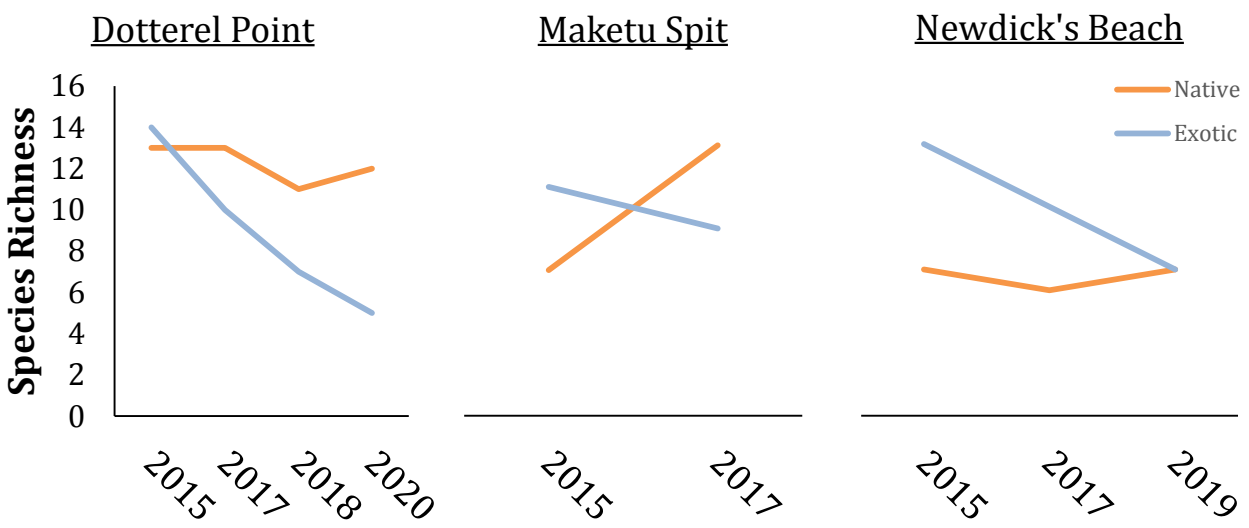

Figure 6 - Apparent changes in species richness of native (including indigenous) plants and exotic plants since 2015 as determined from REECE plots collected at Dotterel Point, Maketu Spit and Newdicks Beach.

These graphs are quite encouraging as they show that we are impacting the weeds quite significantly over all three sites, and while the native species richness at Dotterel Point and Newdicks remains stable, it appears to have increased dramatically on Maketu Spit. This is significant because apart from the bird colonies at the distal end, the key focus of our work on the spit is restoring the native vegetation, so success there it would appear.

Animal Pest Control

Unsurprisingly this is a key area for us and one that we expect to be ongoing. While we do not have all the possible pests, we do have quite enough. Fortunately, we do not have many possums, except in the Waihi Harbour WMR. We have just started using a new self-resetting trap there and initial results are promising.
One interesting conclusion we have come to, looking at our trapping figures, is that in places where we are successful at restoring the native vegetation, as the plants grow and provide more cover, and likely food, then the number of pests will tend to rise. At first sight this may be slightly counter-intuitive, but when you think about it, it is what you ought to expect – we just need to find better and more effective ways to protect the ecosystem as it recovers.

Maketu Spit

We started off the year with our usual grid of bait stations in area 1 – the distal end of the spit. We set out 160 bait stations and kept them filled for the month of July, we then moved about 100 to Area 2 – between trapping fences #1 and #2 during August. The results are, I think, self-evident in the excellent breeding numbers of both NZ dotterel and red-billed gulls. We believe that there was just one very sick mouse left in Area 1 after the programme. We seem to have prevented rats from returning to that part of the spit, we have not seen rat tracks there for several years. We also installed a number of Good Nature self-resetting traps to take care of any rats that may venture across the estuary, or circumvent our fences.

The rest of the pest control takes place at our three trapping fences which simplifies the operation and make it much more time effective, they also act as a physical barrier that helps to prevent casual spread of pests. To date the system seems to have been effective and means that the traps can be checked quickly

and easily. Rats are the main target species, mustelids numbers have dropped which is very good news, mice are not a prime target species and we are hopeful that we may have eradicated hedgehogs.

One of the species that does not go into a trap is rabbit, so this is dealt with using Pindone poison which has the advantage that it also deals with rodents. We had two sessions during the year, firstly in September 2019, and then because that did not appear to have been entirely successful, in May/June of this year. In both instances we used two methods: i) bait is laid on a covered mat which allows very easy access and the cover prevents it getting damaged by rain, and ii) a standard Phil proof bait station, generally attached to a short peg as we are rather lacking in suitable trees. We also used another poison to kill them in their burrows, however it is not always easy to find their burrows. To date we have not seen any renewed signs of rabbits.

Table 2 –Total number of pest animals trapped over 9 years (2011-2020) at Maketu Spit.

Maketu Spit	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
Rat	2	6	6	14	11	13	15	24	23	**114**
Mouse	10	0	0	14	0	11	14	20	4	**73**
Mustelid	4	8	7	6	6	12	1	2	5	**51**
Hedgehog	7	1	10	12	4	3	0	2	0	**38**
Rabbit	0	0	2	1	0	0	0	0	5	**8**

Dotterel Point, Pukehina

Our two main problem species here are hedgehog and rabbit, we ran a couple of session to get rid of rabbit, one in September 2019, the second in May. For whatever reason, the first one was not as effective as we would have hoped. As far as we can tell the second round has done the trick, but we do expect them to return as we are unable to prevent/restrict access to the area.

In 2019 we had a significant hedgehog problem, so this past year we laid out a grid of DOC 200 traps for 3 months after the lockdown. We caught a total of 2 hedgehogs and 1 stoat; I think the first we have caught there. I suspect that a combination of our rabbit control and the local cats keeps the number of rodents down, and Mustelids will tend to be attracted to rodents. Cats would unlikely be interested in hedgehogs, hence their prevalence here. Hedgehogs are a predator of ground nesting birds, or at least of their eggs.

Newdicks Beach

Control has been ongoing throughout the year here, with traps being checked regularly. The main catch has been rats with a number of Mustelids. We plan to use our new self-setting traps for possums in 2021.

Table 3 –Total number of pest animals trapped over 9 years (2011-2020) at Maketu Spit.

Newdicks Beach	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Rat	8	83	82	27	58	33	27	**318**
Mouse	5	6	3	1	4	1	0	**20**
Mustelid	5	19	7	0	8	3	3	**45**
Hedgehog	2	15	6	0	4	4	6	**37**
Possum	N/A	N/A	N/A	N//A	3	Nil	N/A	**3**

Waihi Harbour WMR – West

Pest control continued throughout the year with a network of 17 DOC 200s. These appear to be doing a reasonably good job of keeping numbers in check, certainly the bird life in the reserve appears to be doing well, which is generally a good indicator. However, as our plants mature, we are ironically offering more cover for pests, so we need to up our possum control which has been allowed to slide a little.

Table 4 – Total number of pest animals trapped at Waihi West site (2016- 2020).

Waihi West	2016/17	2017/18	2018/19	2019/20	Total
Rat	47	31	12	42	**132**
Mouse	17	7	1	0	**25**
Mustelid	38	10	12	24	**84**
Hedgehog	23	10	6	8	**47**
Cat	3	4	2	1	**10**
Possum	1	0	2	0	**3**

Waihi Harbour WMR – East

It is a slight surprise that pest numbers appear to have climbed here, vegetation cover has improved which may be part of the reason. Particularly noticeable was our first trap check after lock-down, where after 6 weeks of not being checked, we had a haul of 10 pest animals, and in the period through to July we caught 26 pests, more that the whole of the previous 2 years. The total for the year amounted to 53 pest animals, more than we had caught in the previous three years combined. This suggests we probably need to increase the frequency of trap checks.

Table 5 – Total number of pest animals trapped at Waihi East site (2016 – 2020).

Waihi East	2016/17	2017/18	2018/19	2019/20	Total
Rat	12	9	2	17	**40**
Mouse	5	4	0	2	**11**
Mustelid	10	2	5	26	**43**
Hedgehog	4	1	0	3	**8**
Cat	0	1	3	3	**7**
Possum	1	0	0	2	**3**

Te Huauri O Te Kawa Wetland, Kaituna River

We continue to run a trapping programme here using our good friend the DOC 200. Given the easy access to farmland, we are likely to have to keep it going indefinitely! This year the catch was 7 ferrets, 5 rats, 2 stoats and 2 hedgehogs.

External Contracts

Papahikahawai Island

Papahikahawai is developing really nicely, some of the plants are starting to grow significantly and provide new habitat. The pest control programme here is a stand-alone contract set up by Regional Council. MOWS act's as the contractor. The programme involves three rounds of poison bait plus a regular network of DOC 200 traps. We appear to have removed rabbits and hares from the island, and while we caught 3 mustelids and two hedgehogs before Christmas, we have not had a single one of either in 2020. Rats have not been caught since June 2020.

The first round of baiting uses brodifacoum which is a second generation anticoagulant and provides effective fast knockdown. This is followed by two rounds of Diphacinone which is slightly less effective but degrades faster. It also appears that the mice really like it and even on the third round of baiting, we still had some bait stations being eaten out after 5 weeks of baiting. We are hopeful that consumption will drop over time. However eradicating mice is a big ask, even on a fairly small island. While mice are not a threat to birdlife, they do predate on native skink and invertebrates.

Spartina

This was the third year of the contract with BOPRC. The amount of spartina remaining in the harbour is now very modest. We had left a narrow band along the stop-bank in the south-eastern corner of the harbour as the landowner was concerned at possible erosion implications, however it takes quite a while for the spartina root system to erode away, and this area is somewhat protected from the rest of the harbour. We sprayed out this band plus a few survivors from our previous two years of operation. The trickiest bit is the saltmarsh where the leaves are largely invisible until you walk through the area – and that is not easy. There is talk of bringing a 'spartina dog' down to sniff out remaining plants. There is also a patch remaining on the chenier that we hope to get this year, and there will still be a need to review all areas as it is a very tough customer.

Kaiate Falls and Midway Park, Pukehina

These are contracts offered by Western Bay Council, most of the work this year was weed control, largely invasive grasses, but some of our other regular culprits as well. Kaiate has a wider range of weed species, but this site has seen improvements as a result of management. Midway is a bit trickier as a lot of the problem is to do with alien grasses infesting the wetland vegetation. We also have some planting to do there.

Private Contracts

In order to help fund the Society, we also do some private contract work, our main contract here is a contract with Te Arawa Lakes Management to mow a number of plots around Maketu and Little Waihi, as well as a number of contracts to clear or improve specific sites. We also do some work for individual landowners, particularly in Pukehina where beach front properties often need weed control and planting of natives.

Environmental Education Programme

We continue to educate children on local environmental issues, the importance of our ecosystems and what we can all do to help mitigate these issues. We are very lucky to have great buy in from schools and our loyal funders. This year we were privileged to continue running the full programme with students from Maketu Kura, Paengaroa, Te Puke Primary, Te Puke Intermediate and Te Puke High School (Year 12) all funded by Western Bay of Plenty Regional Council. These schools also enjoyed a new forest study unit in term 1. Pongakawa, Otamarakau, Te Ranga, Fairhaven and Pukehina schools as well as Year 10 Te Puke High School all enjoyed one or two terms of education thanks to TECT and Bay Trust Funding.

Sadly, our long-term education coordinator Tania is moving away to the central north Island to start a new adventure at the end of this year. Thankfully we have a great education team of talented ladies who have been learning the ropes this year in order to take over and keep the programme running well. We look forward to seeing how the programme evolves with new input and ideas from a great team.

Term four 2019

We always enjoy ending the year learning about our estuary food web, from the smallest algae and worms to our kaimoana and the shorebirds that rely on them. To help us achieve this we are privileged to work with Elaine Tapsell and Maketu Taiapure Trust to help them collect data for the annual Kaimoana Survey.

Our core schools, Te Kura o Maketu, Paengaroa and Te Puke Primary have been collecting data on these transect lines for the last 6 years. The results are very interesting and show the effect of tidal flow changes during the Kaituna Re-diversion construction process. In 2019, Fords cut was completely closed for at least 6 months resulting in a lot of sediment build up in our survey area which caused pipi beds to migrate further into the main channel. We are looking forward to seeing the change in November 2020 now that there is partial flow through Fords cut again.

Maketu Kura participated in the litter pick up event along the estuary edge and playground with Bay Conservation Alliance (BCA), Bay of Plenty Regional Council and our key education sponsor Western Bay of Plenty District Council. This included education stations about the impact of our plastic waste on the moana.

All of our events included an end of year prize giving and BBQ to recognize all the tamariki achievements during the year.

Left: Te Kura o Maketu kaimoana sampling. Right: Paengaroa School.

Term one 2020

Students from Te Puke Primary (Unstoppables), Paengaroa and Pukehina School were treated to a new adventure in Term one. MOWS partnered up with the BCA to take them up to view the great work of Otanewainuku Kiwi Trust. Brian Ireland and Emma Cronin are amazing educators and ecologists who work for BCA and have created a fantastic series of activities on the Otanewainuku loop trail. The first station has students listening to pre-recorded bird calls which often bring in an inquisitive North Island Robin. They then move on to a station where they all receive a pair of binoculars and locate small toy birds hidden in the trees and read out the band combinations on their legs. Rare native birds such as Kokako are often banded so people can help keep track of their movements and whether pest animal control measures are working. Students learn about pest animal impacts and the amazing trapping programme run by Otanewainuku Kiwi Trust where over 100 volunteers check their own trap lines once a fortnight to keep the forest safe.

Te Puke Primary with BCA educator Brian Ireland.

We also ran a marine unit with Te Puke Primary (Future Force) where marine biologist Emma Richardson (Discovery Through Nature) taught the kids how to conduct a marine fish survey. They then carried out an experiment in the school pool, learning to snorkel while conducting the survey. Thanks to Emma and Janice (a swim instructor) for their awesome contribution to MOWS education programme. In addition to snorkelling, students came to Okurei to look at the rock pools with Tania. They completed Marine Meters Squared quadrats to assess the species present. This information is vital for events such as the RENA oil spill. Knowing what lives there prior to and following a big event helps assess the impacts. At the moment the biggest impact is sediment from ongoing slips and erosion on the Northern face of Okurei. Many rock pools are silting up, smothering the life within.

Term two

Due to COVID-19 lockdown in Term 2, which saw parents teaching from home, we created resources full of easy fun activities, including a dune poster competition.

At the end of lockdown, schools were keen to get back to normal so we managed to run three field trips as planned. Te Puke Primary (Unstoppables) and Paengaroa School learnt about the important role of dunes in protecting our coastline and providing habitat to special native species. MOWS, in Collaboration with Coast Care BOP, took students to a site in Pukehina where invasive ice plant is smothering the dunes. This succulent has very shallow roots so if a big storm comes in the waves will easily wash it away. The students were amazed to hear that the native sand binding plants Spinifex and Pingao have 2 m deep root systems.

The 75 students from Te Puke Primary had a great time pulling out more than 1 tonne of ice plant from the dune and replacing it with Spinifex and Pingao.

Maketu Kura continued planting at a site they have been working on for the last 6 years. We had one Pohutukawa for the students to plant as well as dune plants supplied by Coast Care.

Maketu Kura Planting Pohutukawa and Pingao at Newdicks Beach

Two dune poster winners, Jayda Bramley from Paengaroa School and Krisha Nair from Te Puke Primary.

Term three

We were very privileged to be invited to collaborate with Bay of Plenty Regional Council, Tapuika and Ngati Whakaue; helping to plant a newly created wetland (converted from Tapuika farm land) on the edge of the Kaituna Management Reserve Wetland. Te Puke High School, Intermediate and six local primary schools were involved in planting a new stand of kahikatea (NZ tallest native tree), flax and manuka. They also took part in activities assessing the water quality of the Tumu Kawa Wetland. These days were a huge success with over 4000 wetland plants planted. The students will return next year to plant the next phase of the wetland and see how this years' plants have grown.

Top left: Senior students from Otamarakau School joined junior students from Te Kura o Maketu on their wetland planting day. Top right: Students from Te Puke Primary surveying macroinvertebrates from the Kaituna River and the wetland. Bottom: Tumu Kawa wetland from Western Stop Bank.

Pukehina and Otamarakau School also enjoyed learning about dune environments this term (after being postponed due to Covid19). Pukehina School weeded and planted in the dunes on the Patara-Ngawhika Whanau Trust land in Pukehina and Otamarakau School planted 678 sand binding plants at Otamarakau foreshore. Both events were organised by Coast Care Bay of Plenty, with buses and in-class education organised by MOWS with funding from Bay Trust and TECT.

Te Puke High School

We are very privileged to be working more closely with Te Puke High School this year, primarily with Level 2 Biology and Earth Science classes. We ran a rocky shore ecology unit with Level 2 Biology in term 1, taking them to Okurei to assess zonation of rocky shore creatures using transect lines and height profiles. Students were tasked with reporting on two species which have interesting patterns of distribution.

In term 1 Te Puke High Level 2 Earth Science completed a water quality study; we tracked the Kaikokopu stream from Redwood Valley Farm in Paengaroa to its outflow in the back of Little Waihi Estuary. Students sampled nitrates, phosphates, turbidity and macroinvertebrates. Thanks to Jane Stevenson from NZ Landcare Trust who supported the trip and provided an E. coli incubator for the MOWS shed. Students were able to test 4 sites for E. coli levels as an indicator of whether the water is safe to swim in. Unfortunately, by the time the water reaches the estuary it was well above the safe swimming standard (and very unsafe for gathering kai). Bay of Plenty Regional Council have identified the Little Waihi Estuary and its catchments as a priority focus and are working with landowners, Iwi, industry, catchment Groups and other interested parties to create plans to clean it up.

Te Puke High School Level 2 Earth Science completed a unit at Tumu Kawa Wetland. They visited the Tumu Kawa in term 2 to assess which plants would be ideal for the site. Back in class they created wetland planting plans and ordered plant species. Then in Term 3 they completed the planting.

Tumu Kawa Wetland. Photo Credit Andy Belcher, commissioned by BOPRC. Centre of this photo is the area Te Puke High School surveyed and planted.

Sixty students from the year 10 classes spent a day at Maketu Spit surveying the dune vegetation in collaboration with the Coastal Restoration Trust. Coast Care also organised a dune planting activity and MOWS took the students on a tour of the spit and the Kaituna River Re-diversion project.

Student surveys

In 2019 MOWS designed and established an environmental education survey to be offered to students from Te Puke and Paengaroa primary schools. A total of 70 year 4 and 5 students were tested on their knowledge of the coastal environment and freshwater with questions from each topic of learning from the MOWS programme. The survey consisted of a preliminary (beginning of term 1) and follow-up (end of term 4) test in the form of a ten-question quiz.

The quiz was conducted to try to evaluate the effect of our education programme and the positive knowledge gains for students involved. The average result for the 70 students in the preliminary test was 3.6/10 and increased to an average score of 6.8/10 in the follow-up test, showing a marked overall improvement of 89% *(Figure 6).*

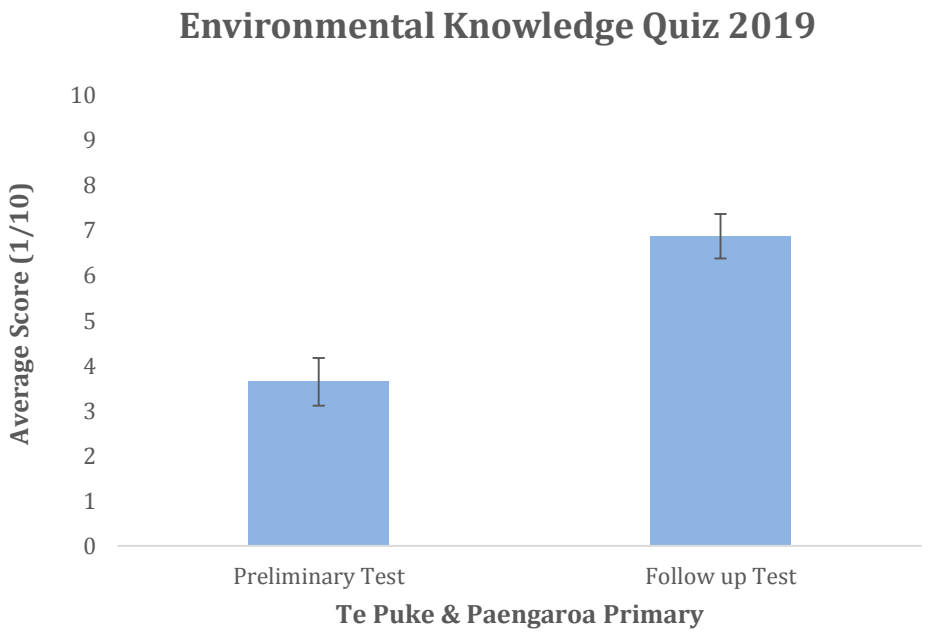

Figure 6 - Average scores of Te Puke and Paengaroa Preliminary and Follow-up Tests results for 2019.

It is interesting to note that within these averages, 20 students improved from 0-2 in the preliminary test to 9-10 in the follow-up test. This demonstrates fantastic learning across the topics during the year.

Table 6 - Summary of test results for year 4 and 5 students from Te Puke and Paengaroa primary schools involved in education programme 2019.

	Student Participants	Preliminary Test average score	Follow- up Test average score	Improvement %
Te Puke Primary	42	3.07	6.26	104%
Paengaroa Primary	28	5.26	8.40	60%

In conclusion, the results gained from both schools clearly indicate that information offered had a positive influence on the knowledge of the students. The marked increase in average scores reinforces the success of the programme material, format and delivery.

The information produced can also be a valuable resource in helping expand the education programme, gaining further funding for expansion and a gateway to offering the programme across more areas and eventually regions. This is a vital aspect to ensure all children have the opportunity to learn about these critical environmental issues and the methods we can use to monitor and improve them.

Annual General Meeting "Breakfast with the Gulls" 2019

The breakfast with the gull's event proved such a great success in 2018 that we decided to continue with the same format for our AGM in November 2019. We had another fantastic celebration at Maketu Surf Club, more than 70 people came along to the event and were treated to a delicious bacon and egg roll. They then registered for a tour of Maketu Spit and eagerly awaited their turn to hop on the Maketu Surf Club IRB to cross over to see the colony of nesting shorebirds. MOWS members were on hand to safely guide people on the spit to ensure the safety of the hundreds of chicks, making a fantastic experience for young and old. A huge thanks you to all the MOWS members who made this event such a success. Once again Maketu Surf Lifesaving Club was a huge support and the ladies from Maketu Rotary cooked an amazing meal. We look forward to our next AGM in November 2020.

Top left: People enjoying the MOWS scope to see the bird colony (funded by WBOPDC as equipment for the education programme), Top right: Laura Rae and Lyne Fraser-Jones feeding the visitors. Bottom: people waiting their turn to hitch a ride over to the spit.

Publications and promotion

- Mai Maketu – monthly; Newspapers – one article per term; School newsletters
- Following each education field trip or working bee we post a story and photos on Facebook which is shared to the School pages, as well as, Pride of Maketu and Te Puke Environment Forum.
- Updated website
- We held a stall at Te Puke A&P show in February. However, our stalls at other events have not been possible so far this year due to Covid19 restrictions.

Submissions and community representation

There are not many issues on which MOWS needs to submit, but when Affco, who have an abattoir up the Kaituna River put in a request to renew the resource consent for their effluent disposal, we felt very much an interested party, especially as the re-diversion means that more river water will flow through the estuary.

We paid a visit to Affco to have a look at the current situation, we checked with experts, this told us two things: i) that virtually no maintenance work has been done on the existing treatment wetlands since they were consented 30 years ago, and; ii) that there is a lot more that could be done. For these reasons MOWS opposed the renewal of the consents and essentially asked them to go back to the drawing board and come back with a better and more effective plan. They have done this, not just because of MOWS, but because most of the submissions, including that from Te Maru o Kaituna asked the same.

Volunteering and Membership

Engagement with our community has proven integral to MOWS success in terms of volunteer numbers and local good will for our objectives. The education programme has proven the most effective tool for community outreach, we have presented at various school parent evenings and prize-givings and have had a good turnout of parents to our field trips this year, with great feedback from those who attend. Our public working bees continue to be a success as well.

Table 7 - MOWS volunteer contributions by category July 2019 - June 2020.

	Number of volunteers	**Volunteer hours**
Management of membership	1	10
Sourcing funding	3	42
Accounting	4	115
Travel	9	160
Promotion - facebook, website, newsletters	3	35
Meetings	12	66
Emails	12	289
Reports	4	80
Market days	4	12
AGM Breakfast with the Gulls	12	36
Education - dune and wetland planting days	650	1300
Machinery and workshop maintenance	2	25
Biodiversity monitoring	5	130
Working bees x 5	173	346
Trapping pests	3	150
Total		**2,796**

Work Gang

The year has turned out to be transformational for MOWS, most of our work gang including our admin team have moved away, got proper jobs or had babies. Our thanks of course for all of you whom have worked over the years, Nick is now in Papamoa and fully employed, Will is in fulltime employment, Steve has relocated to the Hawkes Bay and Jamie has disappeared to the East Cape, on top of which, Tania is emigrating to central North Island. A very special thanks also to Moniqua Nelson-Tunley who has held the fort on the Science front for the last couple of years, even though she now lives in the Waikato.

At the same time, we have been able to welcome back Jenn and Claire as their babies grow, Jenn in particular is picking up the Science gauntlet and we have managed to obtain additional funding to firstly take care of the 10 or more years of data that we have accumulated, and secondly to expand the Science Programme. You will note rather more graphs and statistics than you have found in previous years. To counter the loss of contract workers, we have decided to take on Laura Rae as a full-time Conservation Work Manager, and are currently planning to take on a second and possibly a third employee. Businesses tend to grow, and MOWS is no different. We have managed to build it, very much on a wing and a prayer, with a little help from our friends, but moving into the future it is essential that we root it more firmly in the community and ensure that it has stability and purpose to enable it to survive and prosper in the future.

Bay Conservation Alliance

MOWS is a founding member of BCA, established in 2017, launched in 2018 with just four member groups. This has now grown to 15 members with more groups interested in joining. BCA has recently received funding from MfE to develop a training programme called 'By Conservation Cadets'. This will run three 12-week courses with 10 trainees in each. The first course starts in January 2021. This is an exciting opportunity and has also enabled BCA, with additional help from the DIC CCF Fund, to establish two operations support positions, here in the East we have Wayne O'Keefe and, in the West, there is Emma Cronin. This is a really encouraging development as it will help to strengthen member groups and make all of our operations more professional, and so more sustainable and effective. We look forward to working closely with Wayne in the future.

Our Thanks

We wanted to extend our gratitude to Bay of Plenty Regional Council and Western Bay of Plenty District Council for their support during COVID-19 for our contractors and volunteers. And many thanks to Maketu Rotary for their recent donation towards MOWS work. Our thanks to DOC for their support and especially to Karl McCarthy who has brought new energy into our work at the Waihi Harbour WMR. Special mention to TECT and Bay Trust, both of who have seen our potential and have kept the faith. Our thanks to Te Arawa Management for helping by giving us contract work, and to BOPRC and WBOPDC for also supporting us in this way.

From left: Peter Jackson, Laura Rae (Work foreman), Tania Bramley (Secretary/Education Coordinator), Julian Fitter (Chair), Carolyn Symmans, Nick Webb and Maureen Binns. Photo Credit: TECT Community Awards Finalist.

Funders & Supporters

Funder	Contribution towards
Bay of plenty regional Council	All 4 Environment Plans and some external contracts
Western Bay of Plenty District Council	Education (Te Puke Intermediate Maketu Kura, Paengaroa and Te Puke Primary), Environmental Plans and external contracts
TECT	Education (Snorkel programme, units with Te Puke High School, Pukehina, Te Ranga, Fairhaven, Otamarakau and Pongakawa Schools), MOWS Shed and project management
Bay Trust	Education (Snorkel programme, units with Te Puke High School, Pukehina, Te Ranga, Fairhaven, Otamarakau and Pongakawa Schools), MOWS Shed and accounting
World Wildlife Fund NZ	Te Puke High School – Sustainability Credits - Kaituna Management Reserve Wetland Restoration
Trevelyan's Pack and Cool	General Funds
Forest and Bird Te Puke	Newdicks EP
Department of Conservation	Environmental Plans

MAKETU ONGATORO WETLAND SOCIETY

WILDLIFE CONSERVATION / RESTORATION / EDUCATION
ECOLOGICAL MONITORING / COMMUNITY ENGAGEMENT