



**MAKETU ONGATORO
WETLAND SOCIETY**

ANNUAL REPORT

2019





Contents

Introduction	3
Biodiversity Management Plans	4
Biodiversity Monitoring	11
Animal Pest Control	21
External Contracts	22
Education Programme	24
Events and Promotion	32
Volunteering and Membership	33
MOWS Base of Operations	35
Bay Conservation Alliance	36
Plans for the Future	37
Funders and Supporters	38

Introduction from the Chair

Working in the environment, helping to restore our native biodiversity can be very rewarding, but also hard work. Aotearoa New Zealand has a very interesting collection of natural attributes. We are isolated, situated in latitudes with a benign climate, we have a very varied topography and unique catalogue on native wildlife. However these attributes also make us a very attractive home for all manner of alien species, both animal and plant, chief of course of which is *Homo sapiens* – humans. Along with ‘us’ we have a huge number of introduced alien species, some of which we brought here deliberately (stoats to get rid of rabbits!!), others that have just hitched a ride. However all of them find New Zealand, particularly the Bay of Plenty and especially the coastal zone, an extremely attractive place to live, reproduce and destroy our native biodiversity. So our job, as kaitiaki of our native biodiversity (wildlife) is to fight back against these alien invaders and give our native wildlife a chance. We cannot change the system overnight, but we can start NOW.

Climate Change

No report can be complete nowadays without a mention of climate change and its possible impacts. 2017 and 2018 have certainly been very wet years with around 50% more than our average annual rainfall, however early 2019 was very dry and we are on track for well below average rainfall this year. We had no serious cyclones in 2019 and certainly no high tide to compete with the one on January 5th 2018. However sea level rise is obviously a significant concern. Maketu appears to be on a section of the coast that is being uplifted, while this may protect us from the worst effects of sea-level rise if we manage to keep global warming to 1.5°, the magnitude of the rise predicted (over 2°) would overwhelm the current rate of uplift. So, no cause to be complacent and every reason to press for a major transformation of our way of life.

Julian Fitter,
Chair
October 2019.



Maketu Spit orthomosaic drone photo 2018.

Biodiversity Management Plans – Overview

We run four Biodiversity Management Plans (BMPs), supported by both Bay of Plenty Regional Council (BOPRC) and Western Bay of Plenty District Council (WBOPDC) and the Department of Conservation (DOC), these have been hugely successful. This year our plans for Newdicks Beach and Dotterel Point Pukehina reached the end of their 5 year term and have been replaced with two new ones, these have been renamed Environmental Programmes. We will continue to refer to them as BMPs in this report to avoid confusion.

Maketu Spit – Year 9

This was our first BMP and we are now in our 9th year of operation, overall it has been very successful. The removal of the causeways to Papahikahawai Island has been a great success, in that it reduces the chance of pest animals coming across to the spit, we are hopeful that we may be able to eradicate the worst pests on Papahikahawai and are working with BOPRC on this. We hope to work towards removing all pests from the spit, the new wetland Te Pa Ika and Papahikahawai. With upgrades to the Ford Rd causeway this has the potential to be the first pest free area in the Bay of Plenty.

We held a successful working bee near the bridge to Papahikahawai Island, Chris Ward from Coast Care brought a trailer load of trees and dune plants in increase the biodiversity of the site. Local MP Anne Tolley came along with her team to support the event and provided a delicious morning tea.

Pest Plants

We have made real progress in controlling the weeds on the spit, with a focus on, tree lupin and velvet groundsel, we have widened this to include burr medic and melilot *Melilotus officinalis* as these are threatening to change to soil at the distal end of the spit. Other weeds in our sights are dimorphotheca and gravel groundsel *Senecio skirrhodon* which is starting to spread westward up the spit, quite likely due to our activities. The problem with all weeds at the distal end is that they start growing vigorously at the same time as the dotterel start breeding.

We also have to fight invasive grasses, pampas is no longer a problem as new plants can be dealt with fairly easily, but at the distal end the gulls always bring in new seeds and we have a particularly large-leaved grass that we have yet to identify and hard to deal with once the gulls arrive in September. This year we made a major effort with Kikuyu grass, especially at the western end of the spit where it threatens to overwhelm some of the muehlenbeckia. We also had a session on rats-tail grass *Sporobolus africanus* which has appeared mainly on the trail, and which we have spread further down the trail. We are making progress with all these invasives, but it is a constant battle and for every pest we get under control, at least one more appears!

The pine trees are also nearly dealt with, there are just two trees by the #2 fence, and one low spreading on at the top of the dune to be dealt with in the next year. We had a two more bonfires this year to get rid of the dead wood close to the beach. It is really interesting to see the number of taupata *Coprosma repens* that appear as soon as we remove the pines, so while it will take a few more years for the dead trees to disappear completely, quite a few will be replaced by taupata and other natives.

Dune profile monitoring – Maketu Spit

We have continued our quarterly monitoring of Maketu Spit in conjunction with BOPRC, we started this in 2015 as we were concerned at the implications for the gull and shorebird colony at the distal end of the spit. Erosion is continuing on the harbourside (Figure 2), but it looks to be matched by the growth on the ocean beach side (thanks to the dune plants trapping sand – Figure 1). We are well aware that one really large storm can cause serious damage. What will be interesting in the future, is if the redirection work affects the profile in any way, with the new culverts due to be in full operation next year, we may see some changes.

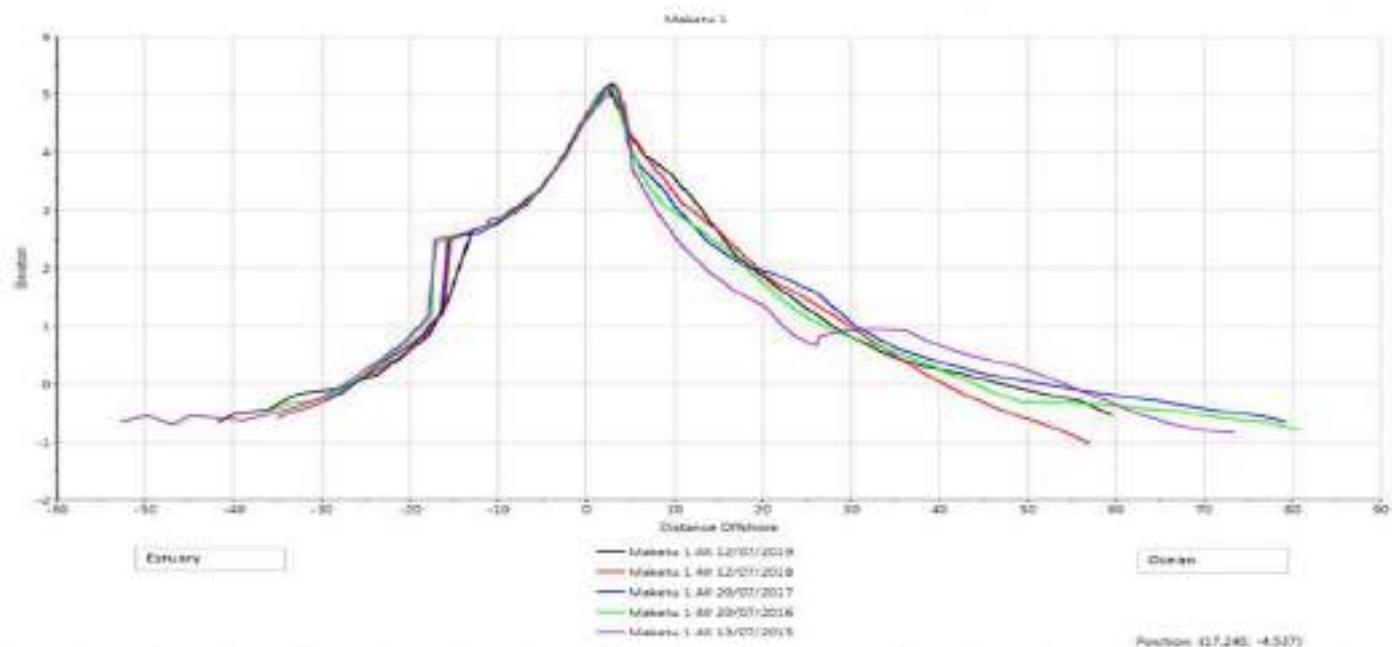


Figure 1: Shows how the dune had been eroded in 2015, purple line, but has rebuilt over time, with the black line being the July 2015 measurement.

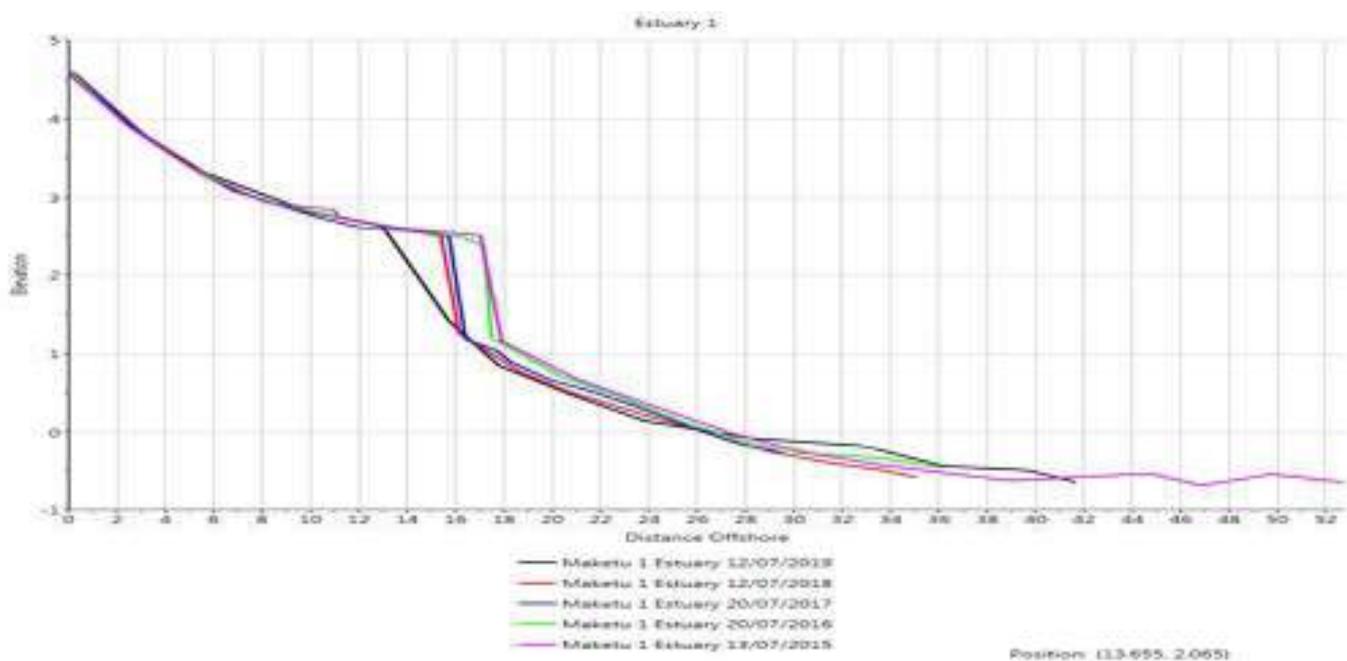


Figure 2: Harbour side in greater detail showing the steady erosion over the years (4m from 2015, purple line to 2019, black line). There is a slight suggestion that the erosion is not constant, but goes in bursts.

Dotterel Point, Pukehina – Year 6

The new dune inside our fence at Pukehina has continued to grow and we wonder how long it will take to reach the height of the old dune – we are constantly amazed at how effective our sand-binding plants, *Spinifex Spinifex sericeus* and *Pingao Ficinia spiralis* are at building dunes. Interestingly while the breeding area for shorebirds is theoretically reduced by the dune growth, monitoring shows that we have more dotterel and oystercatchers than ever.



Dotterel Point, Pukehina showing sand build up due to protection fence and dune plants.

Pest Plant Control

Dotterel Point is quite different from Maketu Spit as it has two distinct sections, the Eastern bit is old well-established dune with some 50 pohutukawas, some 30 years old or more, while the eastern point is all new and so relatively poor in plant species. The drought in early 2019 did kill a couple of the pohutukawas. We also have the issue of the number of people visiting the area, which inevitable results in some weed issues. One huge step forward this year was the removal of three more of the Norfolk pines that are such a blight on the point. They were removed completely with the trunks being logged while the branches were chipped and taken away for mulch. The removal of these monsters allows us to plant natives which are much more appropriate and help to encourage other native biodiversity. Just three more to go!

Our main focus for the year was the new surf club sewage system effluent field – this occupies an area about 20m west of the Surf Club and close to one of the remaining Norfolk pines and our compost bin. We received a contract from WBOPDC to replant the area, but it has been quite tricky as while many of the planted shrubs, especially taupata have done extremely well, so have some of the weeds! We have also got a serious problem with *Oxalis pes-capra*. There was a little around before, but the material brought in for the effluent field clearly had some corms and it has had a field day. It is an extremely difficult plant to get rid of as it develops corms underground which separate off, so that while you may kill the main plant, some corms almost always survive. We are taking care in its removal though there is inevitably some collateral damage. The dry period at the beginning of the year also killed off most of the wiwi that we had planted as part of the project, thankfully that has been replanted by Coast Care and a corrections gang.

The other annoying weed we have here is montbretia, another plant with a corm or bulb, while we can pull some of these, the bigger ones we have had to treat by pasting the leaves with Glyphosate gel. That seems to be working, but we will not know how well until next season.

Newdicks Beach - Year 5

It has been a busy year with four new sites cleared of weeds and planted. May involved site prep with final spot sprays for broadleaf and grass weeds. In June Tania supervised a PD crew to remove dead vegetation from a slip at the end of Pim's dune. 1.5 tonnes of greenwaste was removed and composted on site in in the back of the Newdicks Car Park.

In collaboration with Coast Care we planted two sites at public working bees and two sites with the work crew due to the steeper terrain. We restored native biodiversity by planting Ngaio (which grow most effectively at the site), taupata and pohuehue. Coast Care provided pingao, Spinifex, wiwi, sand coprosma, pohuehue, coastal mahoe, native ice plant, and flax. The majority of the trees have covers on and have been mulched.



Top: Newdicks working bee in the left hand car park. Bottom: Newly planted trees in upper car park.

We erected two new fences with signage. One around the new planting in the left hand car park (also planning to build steps there), and one in the middle of the Eastern dune where people have been driving through Arawa Farm on to the beach to avoid paying the Newdicks gate fee. People were driving through the farm gate and instead of going straight on to the beach they turned along to top of the dune. This is now fenced off and tamariki artwork in place saying “please don’t drive on the dunes”.

Existing plantings are surviving in the bank zone though a lone billy goat has been browsing (Matt the farmer has been asked to get him for us). The upper car park plantings are thriving and we have had one session in there removing gorse that had grown in the last year and planting a few more trees. It is really worth a look next time you are there. The Spinifex and pingao planting along the entire bank zone in previous years has continued to build up well with only two areas needing more plants in 2020. We have identified 3 new sites for planting in the bank zone in 2020. One of which will require removal of pine trees first.

Waihi Harbour Wildlife Management Reserve - West – Year 5

When you visit Waihi Harbour WMR, it is hard to believe that a mere 4 years ago it was a pampas wilderness. It is quite amazing how well it has developed, but we still have a long way to go. We had one large wattle tree fall into the Pongakawa stream early in the year, and it looked to be causing erosion on the opposite bank, its removal by DOC should have reduced this threat. DOC have been very supportive and have removed most of the large wattle trees on the Pongakawa stream side of the reserve, including all of those on the stream bank which were threatening to fall in. They have plans to remove some of the ones leaning out over the Kaikokopu stream, hopefully this coming year.

Water Levels

This has been an ongoing issue since the start of the project, there is only one culvert allowing water into the wetland, inside of which is a weir, however the weir is not sealed at the sides, so when the tide is below the wetland level water continues to flow out. In February, John Meikle of Fish and Game and Karl McCarthy from DOC fixed this by installing new weir boards and sealing the sides of the weir. This has worked well in general terms, though we have as before had problems with a person or persons unknown, interfering with the fish friendly device on the flapgate and allowing more water into the wetland than we need. At present the weir is set at 4.9 which is an OK level for inside the wetland, maybe a bit on the high side. However in order to allow water in for fish to access the wetland, this means that the level will normally be significantly above 4.9, especially during wet periods. Early days so we will hope to sort the issue out in the coming year.

Plantings

Planting focussed on filling in the gaps on the western side of the Reserve, and also in looking to develop a bit of an understory – following planting trees and shrubs, we need to remember that a natural ecosystem will also have an understory, herbaceous plants, epiphytes, ferns etc. So this year with the help of funding from WBOPDC we purchased a number of ferns which were planted strategically along the western side of the reserve, in and amongst, or close to the existing plantings. The best place to see this is the old burning site, just by the second gap in the windrow, where we are developing the ‘Ayo Fernery’. It will be interesting to see how this develops, but we already have Poroporo in the reserve, and that has arrived naturally, presumably via bird droppings. With the same funding we also started planting native trees on the eastern stopbank, that has been reasonably successful, though the drought at the beginning of the year did some damage, and we also had to contend with rabbits which just love taupata! We were able to do some additional planting thanks to the generosity of Mark Anderson of Grow-well Kiwi, who donated several hundred plants, which we used mainly on the Eastern stopbank.



Photo: Working bee with Trevelyan's Pack and Cool staff planting on the eastern stop bank.

Pest Plant Control

This is an ongoing programme, the main plants we have focussed on are pampas, gorse, blackberry, and inkweed, none of them are a major problem any longer, but they do take quite a while to overcome. The one area of pampas we are not completely on top of is the wetland area south of the east/west causeway. This was the area that was originally farmed, and one problem that we have is with the drains which make access difficult, and to a lesser extent the amount of rusty barbed wire from the old fence system. This year we made a major effort to get into the wetland and to hit as much of the pampas as we could on foot, however some of the drains were too wide to safely cross and so we are planning an aerial assault in early 2020. The other weed, which is rather harder to control is sea couch *Agropyron pungens* which occurs in patches all around the harbour. We have been working on the area in front of the western part of the reserve for several years, and have made some progress but it is a tough customer as it spreads both by rhizomes and seed.

Waihi Harbour Wildlife Management Reserve Wetland - East

Our strategy for this part of the reserve, has been simply pest control – both animals and plants, we have no immediate plans for planting. However we are concerned at the amount of erosion taking place at the mouth of the Pongakawa Stream, this is aggravated by whitebaiters and was not helped by the fallen wattle on the western bank which we finally removed in May. We check our trapline here on a monthly basis and get a regular catch.

To mitigate erosion we are looking at using *Bulboschoenus*, a perennial sedge, we are hopeful that we may also be able to use it to replace the *Glyceria maxima*, an invasive grass which is found on the stream banks and is starting to invade the wetland area. Once we have finished planting on the western half of the reserve, we may look at planting native trees and shrubs in this area also.

Pest Plant Control

The main weeds are as on the western part of the reserve, pampas, gorse, inkweed and bramble. There is no doubt that natives, especially giant rush *Juncus pallidus* and bracken are starting to take over parts of the stopbank. The weeds are hit twice yearly which keeps them at bay as natives gradually take over. Two specific targets this year have been the two 'islands' of vegetation in the salt marsh, these are two small

circular areas where excavations have resulted in a non-tidal ring which has become covered in pampas. Last year we hit them both using a very long (180m) hose and our larger power sprayer, this was very successful, but we followed that up this year with a backpack spray. There is still a very small amount to be sorted this coming year, after which we hope we can leave those two areas in peace.

“by de Ley” Wetland, Kaituna River

Report from Peter Ellery

In another year that flew by, two major events for the wetland. Firstly, finally, the signing of an Environmental Plan, with the Regional Council, the District Council, the Landowner, the Maketu Taiapure Trust and the Wetland Manager (me). This creates a Councils contract with the wetland manager as a permanent part-time position, to care for the wetland with fish-habitat as the primary focus and the usual wetland care of eradication of weeds and predators. As well as carrying out the physical care of the wetland, the manager is also required to be able to lead guided tours and education classes. This is a long-term goal of mine fulfilled, to create an individual position for a person who knows what has to be done and is responsible for seeing it is done. With more wetlands being created there will be a need for more people with these skills across the country.

I have been lucky in engaging Laura Rae as an intern, training to be capable of filling the position of wetland manager, as the current wetland manager fades into aged incapacitation and obscurity. Our recently elected Community Board member has already proven to be capable and reliable in this training and ready to take on anything. She’s even found a new skill at white baiting and the joy of being able to give her dad a feed. This is a lady that’s going places, kia kaha, you go girl.

The councils have supplied 2 new bridges, with one more to come, to ensure safety for school groups and public. Some boardwalk and steps for these bridges and other track improvement work will be carried out this summer. Predators continue to pop up. As well as the occasional rat, stoat, hedgehog, 4 ferrets have been caught in October. I’ve never caught any there before.



Installing new bridge at by de Ley wetland

Weeds will always rear their ugly heads and gorse, blackberry and pampas will have to be controlled annually for a while yet. Honeysuckle has taken off again and is the focus of another hammering this spring. And speaking of spring, the whitebait came in good runs after a well-populated inanga spawning last autumn. Spawning observed/recorded in February, March and April. Same as last season, this season we have caught whitebait and released, (some of them) back into the wetland ponds to mature towards another hopefully, good spawning next autumn.

From Oct 30th to Nov 1st I participated in the bittern survey at the wetland. One bittern seen flying up the river, none heard booming there, but some were in other places. I was lucky to have Paul Cuming come with me on the 30th and he did a bird count while we were there and identified 27 species including a seen and heard spotless crane.

Biodiversity Monitoring

Regular reptile, invertebrate and vegetation monitoring continues to be completed by our ecologist Moniqua Nelson-Tunley. While Jamie Moko is being trained to eventually run the reptile monitoring.

Reptile Monitoring

Three species of reptile have been caught to date at our monitoring sites; shore skink (*Oligosoma smithi*), moko skink (*O. moco*) and plague skink (*Lampropholis delicata*). Shore skinks are a native, naturally uncommon species that inhabit intact coastal environments of the upper North Island. This is the main species found at the Maketu Ongatoro Wetland Society sites, and so the bulk of monitoring information is in regards to this species. Moko skink are a native, relict species (now occupying <10% of their former range, but over 20,000 individuals and population stable or increasing), which have suffered a significant decline as a result of human impacts (Hitchmough et.al. 2015). Plague skinks (formerly called rainbow skinks) are rapidly spreading across New Zealand and are able to reach high population densities in a short time.

Plague skinks were detected at Waihi Wildlife Management Reserve East in October 2018. Only two plague skinks were seen during over a period of several hours, so it appears the population has not reached plague levels yet. A plague skink was detected in February 2015 at Maketu spit, but repeated monitoring has failed to detect further individuals of this species.

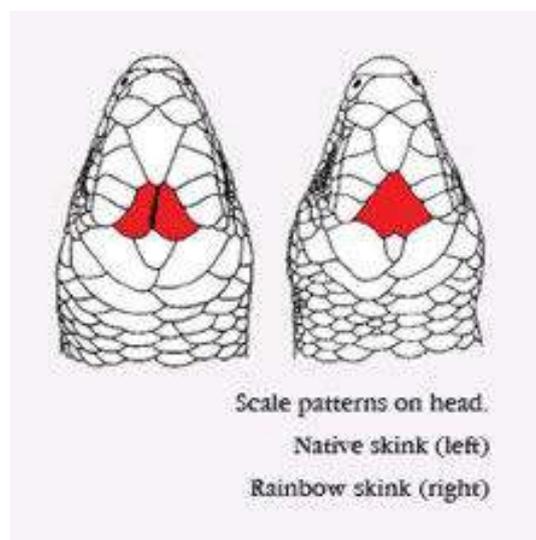


Figure 3: The difference between native and plague/rainbow skink scales. Sourced from Department of Conservation website.

A single Moko skink has been detected at Dotterel Point’s backdune reptile monitoring grid in November 2016. They have not been detected since. All other reptiles caught for this monitoring project have been shore skinks.



Shore skink (Oligosoma smithi) eating fresh banana in a pitfall trap (photo Moniqua Nelson-Tunley).

Reptile monitoring commenced at Dotterel Point, Newdicks beach and Maketu spit in September 2014 and since then has been conducted twice yearly in spring and summer. Monitoring was not conducted in summer 2018 due to frequent inclement weather. Monitoring at Waihi Wildlife Management Reserve West was conducted in November 2016 and February 2017 without detecting any lizards.

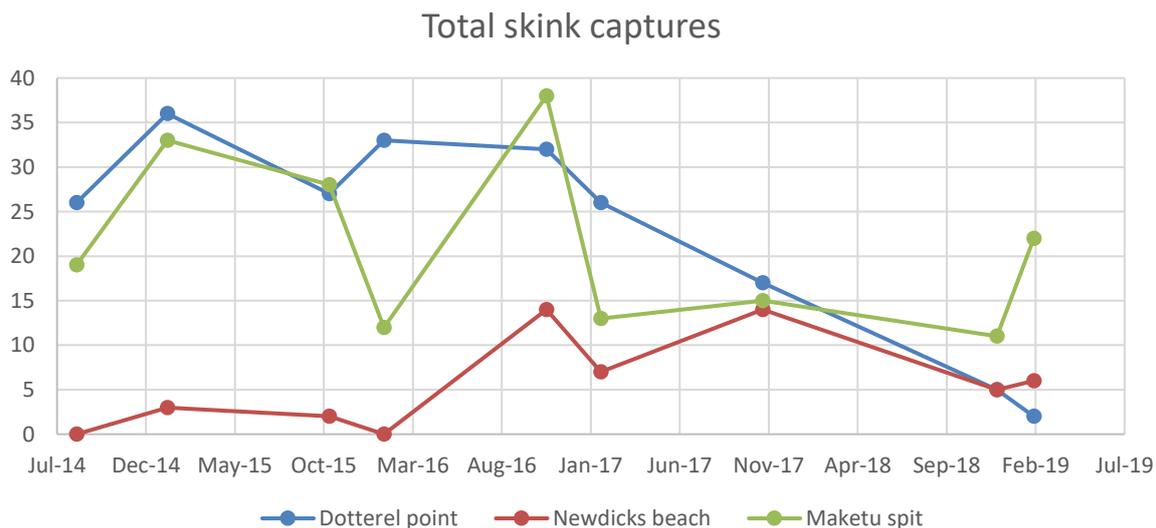


Figure 4: Total skink captures at Dotterel Point, Newdicks beach and Maketu spit from September 2014 to February 2019.

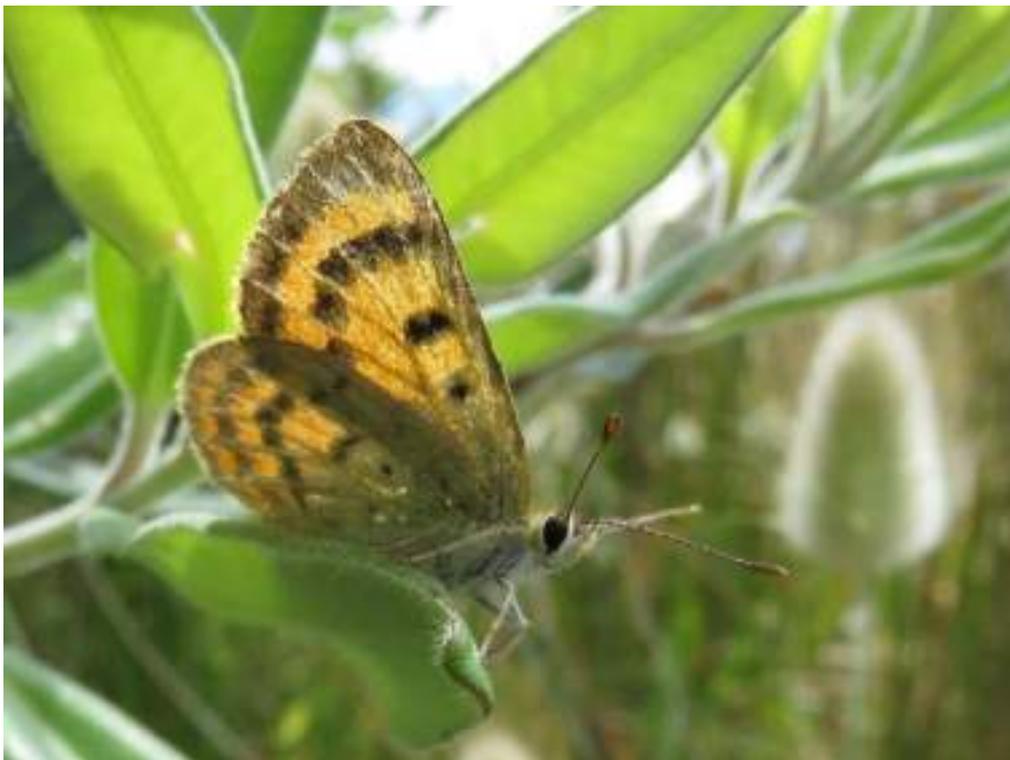
There appears to be an overall decrease in the number of skinks detected at all sites over time. Of particular concern is strong decline in the number of lizards being caught at Dotterel Point, with the lowest recorded number in February 2019. Possible causes for this long-term downward trend could be predation or change in vegetation. Following this result, Maketu-Ongatoro Wetland Society volunteers trapped Dotterel Point intensively and caught 13 hedgehogs in a short period of time. Vegetation has not changed significantly enough to detriment the lizard population (see vegetation section).

The eventual detection of shore skinks at Newdicks beach could be related to pest control allowing the population to increase to detectable levels or to become more active as less predator avoidance is needed.

To date, 135 shore skinks have been reliably photo identified. One moko skink has been detected at Dotterel Point and three plague skinks have been detected; two at Waihi WMR East and one at Maketu spit.

Invertebrate Monitoring

The invertebrate monitoring results are somewhat complicated. Preliminary invertebrate monitoring has been conducted at all four sites in December and April to capture seasonal variation. Monitoring will be repeated for all sites four years after the first monitoring took place (i.e. from April 2019 to December 2020).



Common copper butterfly (Lycaena salustius), photographed at Dotterel Point. This species is a pollinator of coastal flowering plants including pohuehue and sand daphne.

Vegetation Monitoring

Modified Recce plots (measuring 5x50m instead of 20x20 to enable monitoring a broader width of dune) have been established at Newdicks beach (3 plots), Dotterel Point (3 plots) and Maketu spit (6 plots). Within these plots, the abundance of each of the species present, as well as their height tier are recorded. These plots include a photo point at each narrow end of the plot consisting of four photos pointing in opposite directions in order to detect visible changes.

The most noticeable change over time in each Recce plot is the presence or absence of annual plants, particularly hares tail (*L. ovatus*), which in some plots is one of the most abundant species in summer. Although hares tail is an exotic species, it is not considered a pest plant because it does not appear to out-compete native species. Exotic iceplant (*C. edulis*) was effectively controlled to the point it was no-longer detected in two of three RECCE plots in February 2019. In some plots (particularly at Dotterel Point), single trees or shrubs are detected in one year and not in other years- this is an artefact of the plot not having

physical markers. The plot may shift by $\pm 3\text{m}$ each time it is monitored due to GPS accuracy, but this variation will only impact recording of very rare species such as individual trees.

Table 1: Species richness, number of native species, number of exotic species, and % cover bare sand (i.e. % of the plot that there was no vegetation) for each RECCE plot.

Site	Recce name	Date	Species richness	# native species	# exotic species	% bare sand
Dotterel point	1	30/05/2015	5	4	1	75%
		7/01/2017	2	1	1	No data
		21/04/2017	1	1	0	90%
		3/02/2019	12	6	6	No data
	2	30/05/2015	11	5	6	25%
		7/01/2017	14	7	7	No data
		21/04/2017	11	6	5	40%
		5/02/2019	10	5	5	No data
	3	30/05/2015	15	8	7	10%
		7/01/2017	19	12	7	No data
		21/04/2017	13	8	5	25%
		5/02/2019	7	5	2	No data
Newdicks beach	1	30/05/2015	12	5	7	25%
		7/01/2017	10	5	5	25%
		19/05/2017	8	5	3	30%
	2	30/05/2015	12	6	6	10%
		7/01/2017	11	4	7	25%
		19/05/2017	11	4	7	20%
	3	30/05/2015	9	5	4	25%
		7/01/2017	6	4	2	25%
		19/05/2017	8	5	3	20%
Maketu	1	27/12/2015	13	7	6	No data
		6/05/2017	12	7	5	30%
	2	27/12/2015	8	3	5	No data
		19/05/2017	8	5	3	10%
	3	27/12/2015	11	6	5	No data
		19/05/2017	12	8	4	20%
	4	27/12/2015	7	4	3	No data
		19/05/2017	9	6	3	20%
	5	27/12/2015	5	3	2	No data
		6/05/2017	8	6	2	10%
	6	27/12/2015	8	5	3	No data
		6/05/2017	6	5	1	70%

Few pest plants were detected at Maketu Spit, likely the results of long-term pest plant control at this site. Pest plant control has been undertaken for a shorter period for Newdicks beach and Dotterel Point, and thus there are more pest plants present. *Agapanthus (A. praecox subsp. orientalis)*, exotic ice plant (*C. edulis*) and *dimorphotheca (O. fruticosum)* are all garden escapees that have been detected at both Dotterel point and Newdicks beach- as there are no residents nearby Newdicks, it's likely these are carried here on storm surges. Absent from Dotterel Point are the pest grasses that occur at Newdicks beach and Maketu. There is not enough data to detected a significant change in the species richness or number of native versus exotic species at any site.

Photo points are a useful method of illustrating vegetation change that is easy for laypeople to understand and requires no special expertise to conduct or interpret. They appear to detect changes that are too subtle for the RECCE method to pick up, such as plant growth or movement (ie dune accretion and erosion). Their main disadvantage is they are not quantitative, which can make it difficult to detect changes in abundance.



Photo point MVEG 1A, facing east, in November 2015 (top) and repeated in May 2017 (bottom).

Future monitoring:

- Reptile monitoring will be conducted at Dotterel Point, Newdicks beach and Maketu Spit in November/December 2019 and repeated in January/February 2020, using the current pitfall trap method. Tracking tunnel monitoring could be conducted at Waihi Harbour if considered necessary. It is possible to differentiate between plague and native skinks from their tracks and it is not necessary to conduct pitfall monitoring at Waihi Harbour unless native skinks are detected.
- Invertebrate monitoring will be conducted at Dotterel Point and Newdicks Beach in November/December 2019. In April 2020 invertebrate monitoring will be conducted at Maketu Spit and Waihi Harbour in November/December 2020 and repeated in April 2021.
- Vegetation - RECCE plots and photo-points are due to be monitored at Maketu Spit and Newdicks Beach in December 2019.

Shorebird and Seabird Monitoring 2018/19

Observations were undertaken at approximately fortnightly intervals, by two observers, Julian Fitter & Jennifer Shepherd, there was good correlation, between the two observers, in numbers counted this tends to confirm the accuracy of the counts. Monitoring started a little later than normal 8/9 September due to JF being overseas.

Maketu Spit

This was our tenth year of monitoring shorebirds on Maketu Spit and just look at how the numbers have changed. The only numbers that have gone down are dotterel chicks and this is largely due to the difficulty in spotting the chicks in the vegetation, which while quite sparse in the winter, become much thicker in the spring and summer. This year we are planning to hit some of this vegetation, especially clover and burr-medick, before it can get going, but once the dotterel start nesting, we cannot risk being in the nesting area. White-fronted terns are a bit variable, in 15/16 they started to nest, but after some of the red-bill nests were washed out, the gulls took over and pushed the terns out.



Maketu Spit gull colony being eroded, December 2018.

The pre-season rodent control is designed to give the birds the best possible chance for survival, eggs and young chicks are very susceptible to rats or hedgehogs, to say nothing of stoats and weasel. We firstly set out a grid of 30 tracking tunnels to see what pest species were there, these showed significant numbers of rats especially along the harbour edge. We then laid out a grid of 160 bait stations on 20m spacing covering the whole of the distal (eastern) end of the spit apart from some 100m furthest away from the tip of the spit. Pest-off (Brodifacoum) blocks were used over a period of 4 weeks, after which we reinstalled the tracking pads – result zero rat or mouse prints, a couple of cards had skink footprints and several had invertebrates including two which showed centipede tracks.

Once cleared of pests we try not to disturb the birds, apart from the regular monitoring, which is done almost exclusively by walking around the perimeter. The species we are most interested in are the northern New Zealand Dotterel, red-billed gull, black-billed gull, variable oystercatcher and white-fronted tern.

Table 2: Annual bird monitoring results for Maketu, average number seen.

Maketu	09/10	10/11	11/12 RENA	12/13	13/14	14/15	15/16	16/17	17/18	18/19
NZ Dotterel	16	21	14	22	27	29	27	26	28	30
NZD Juveniles	6	8	3	6	3	4	5	1	0	2
V. Oystercatcher	20	29	22	28	30	29	44	42	49	41
VOC juvenile	7	9	3	16	10	10	5	8	20	19
Red-billed Gull-	400	800	100	400	1000	1000	1600	1000+	1500	2000
Black-billed gull				79	50	50	71	72	58	42
Black-billed Nests				43	28	38	36	36	45	15
White-fronted tern	44	240	30	42	250	350	320	300	300	220
WFT - nests	25	120			125	154	<200		300	>80

With variable oystercatcher and dotterel, averaging the observations is the best way to get an accurate result, but with colonial nesters such as gulls and terns, maximum numbers are the significant figures. In all cases numbers of chicks is very relevant, but with the red-billed gulls, there are so many that it is nigh on impossible to count them.

2011 was the year of the MV Rena, so figures for that year are a bit up the creek, but otherwise the figures show a continuing improvement in numbers and breeding success. Juvenile NZ dotterel figures shown are not representative as they are extremely difficult to spot in the vegetation on the spit, early in the season it is quite open, but by October, it is quite dense. Black-billed gull numbers are a bit variable, but they are also not that easy to spot as they nest in small groups within the red-bills' colony. The white-fronted terns were down a bit this year, but they continue to favour the spit and the company of the gulls.

Dotterel Point, Pukehina

This is always an easier area to monitor, it is much smaller and more open, we do not carry out any pre-season pest control as we have had remarkably little trouble with rodents, hedgehogs or mustelids at the site. We do adjust the fence each year as the spit is constantly changing shape, and also make additional temporary fencing when birds nest outside the main fenced area. – in 2018/19, two pairs of NZ Dotterel did this, one to the north of the fence and the other about 200m east of the fenced area. Variable oystercatchers also nested along the beach and on top of the old dune.

At this site we focus exclusively on Variable oystercatcher and NZ dotterel, though we do record other waders and birds of interest. While the chick totals do not necessarily record the actual number that fledged, if even half the numbers observed fledged, then we would be very pleased with that result. Here again the figures show a consistent increase since the Rena event in 2011 when four pairs on NZ dotterel were removed, and later returned.



NZ Dotterel eggs in a nest at Pukehina.

Table 3: Annual shore bird monitoring results for Dotterel Point, Pukehina, average number seen.

Pukehina	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
NZ Dotterel-avg.	13	14	15	17	18	21	20
NZD Juveniles	2	3	7	8	8	11	15
V. Oystercatcher-avg.	15	20	20	25	26	26	30
VOC juvenile	4	4	5	10	12	18	19

So dotterel numbers at Pukehina remained steady, but with a likely significant increase in young fledged, while oystercatcher numbers increased with fledged young similar. Again you can see a good increase in numbers. It is likely that numbers will not increase greatly as it is a small site and can only accommodate so many pairs of a species which is very territorial when breeding. It would be nice if they would cross the harbour entrance and nest at the eastern end of Newdicks Beach, but there is increased vehicular traffic there which would probably discourage them.

Northern New Zealand Dotterel - *Charadrius obscurus aquilonus*

Another excellent year for the dotterel, while chicks are hard to spot on Maketu Spit, we are confident that a good number managed to fledge. Dotterel Point speaks for itself, we are conscious that the one issue here is the growth of the dune and the loss of breeding area. However the spit is so mobile that it is constantly changing, eroding and growing, so should continue to provide into the future.

Variable Oystercatcher – *Haemantopus unicolor*

Oystercatchers too continue to prosper, they too could be affected as the spit changes, but they are a bit more flexible as we have had them breeding on top of the old dune.

Red-billed Gull - *Larus scopulinus*

These gulls are such a great feature of Maketu in the spring and early summer. They do seem to have decided that they like the spit, in spite of getting partly washed out from time to time, they are developing to become the largest individual colony in the North Island.

Black-billed Gull – *Larus bulleri*

Numbers of this endangered species seem to fluctuate quite a bit, counting them can be tricky, but they do seem to be a permanent feature of the colony, even if they are not obviously increasing in numbers.

White-fronted Tern – *Sterna striata*

Not quite as regular as the gulls, but they clearly like it here and it is possible that they nest close to the gulls for added security.

Matuku – Australasian Bittern

The Waihi Harbour WMR is an excellent place for bittern, with large areas of natural saltmarsh, an enclosed mainly freshwater wetland, streams and farm drains, all of which seem to be favoured by Matuku. We are fairly certain that they breed regularly in both parts of the reserve and we are working with DOC to develop a better protection and monitoring programme.

The 2018 – 2019 year has been fairly quiet in terms of monitoring after the death of Tumanako (TX40) shortly after her release and Teddy (Tx 17) shedding his back pack. In both cases the transmitters were recovered. In November 2018, early in the breeding season, another male was caught and tagged in the Waihi Harbour reserve with a radio transmitter Tx 54. This bird, provisionally named Freddie, is a bit of a wanderer and has been tracked at the Lower kaituna WMR, and may have visited other wetlands, but without a GPS tracker it is hard to be sure. Currently he is back in the eastern section of the Waihi Harbour reserve. Male bittern have been known to travel hundreds of kilometres visiting multiple wetlands.

In February, a starving juvenile male bittern wandered onto a Welcome Bay property on Ranginui Rd, and was transferred to Gordonton near Hamilton for care. He was named Toa (TX66) and was released into the western side of the Waihi Harbour reserve in early October. He is a strong and stropy individual, which we hope bodes well for him being able to settle in and become established. He carries a GPS unit donated by Te Puke Forest & Bird, a really valuable contribution. Releases are normally made in the spring, after the duck hunting season, when there should be a plentiful supply of food and before the nesting season which brings intensified male aggressive territorial behaviour.

Because bittern tend to live in wetlands amongst tall reeds and rushes, counting them is difficult. The best way of establishing the number of bittern in any area is by listening for the males ‘booming’. This is a sound that travels a long way, and by listening you can get a good idea of how many males there are in any given area. Last year a modest listening survey was carried out which identified four males in the Waihi Harbour WMR. This year, in late October, a more comprehensive survey was carried out by DOC with many more listeners over three consecutive nights. Listening was carried out with more listeners in Waihi Harbour WMR and at a total of 25 different sites covering Whakapoukorero Wetland in Maketu, the Lower Kaituna river, the Lower Kaituna WMR and around Tauranga Harbour. This should give us a much better handle on numbers and will hopefully be a part of a major effort to protect bittern and grow their numbers.



Bittern and pied stilt with bachelors buttons a native wetland plant; Waihi Harbour WMR. (Photo Karl McCarthy, DOC).

Emma Williams who has been instrumental in helping to develop the bittern monitoring programme here, joined the staff of DOC and based in Christchurch. Initially her role was Science Adviser – Wetland Birds, she has recently been given a new wider role monitoring all mobile species. There will be a new appointment to her Wetland Birds role, and two people have been recruited for the summer season to work on bittern across the North Island. Hopefully this will develop, in due course into a nationwide bittern protection programme. We are optimistic that Bay of Plenty may become an important region for matuku in the future, and that these secretive but very attractive birds, will become much more common and better looked after by everyone in the area. Wetlands are very much flavour of the month, and bittern are a very good indicator of wetland health, if we can link the two together, we will have a win, win.

Table 4: Waihi Harbour WMR Bittern records.

Tx#	Name	Sex	Origin	Date tagged or released	Last signal	Notes
36	Mr.36	M	Tauranga refugee	Aug '16	Nov '16	Killed Maketu Road
38	Pearl	F	Tga refugee, 1st female tag	Aug '16	May '18	Mortality signal July 18 ?
17	Teddy	M	WHWMR local capture	Dec '17	July' 18	Transmitter shed & recovered.
40	Tumanako	F	Windermere refugee	Aug '18	Sept '18	Died
54	Freddie	M	WHWMR local capture	Nov '18	23Oct19	Not officially named
66	Toa	M	Welcome Bay refugee	Oct '19	23Oct19	aka Warrior. GPS tracker.

Birds New Zealand Survey

Each year, as part of the Birds New Zealand (previously Ornithological Society of NZ) shorebird survey, we take part in a survey of both harbours in May and November. The table gives you an idea of the variety and numbers of birds that Maketu and Waihi Harbours have to offer, in future reports we will add more historical data so that you can get an idea of the richness and variety of the birdlife here. The one record of real significance here is not a shorebird, but a bellbird, recorded in May, this is an amazing achievement considering how the site was overgrown pampass and inappropriate for bellbird just 4 years ago. Planting natives really does work.

Table 5: Annual Birds New Zealand survey for Maketu and Little Waihi.

Species	Maketu Nov18	Maketu May19	Little Waihi May19
SI Pied Oystercatcher	2	200	2
Variable Oystercatcher	41	18	125
Pied Stilt	54	132	378
New Zealand Dotterel	37	40	40
Banded Dotterel	2		2
Wrybill			51
Spur-winged Plover	3	12	39
Bar-tailed Godwit	6	3	6
Black Shag	2	40	14
Pied Shag	13	3	3
Little Shag	20	24	20
Little Black Shag	36	6	36
Black-backed Gull	11	102	60
Red-billed Gull	1000	33	281
Black-billed Gull	6		6
Caspian Tern	3	1	3
White-fronted Tern	150		
White-faced Heron	20	9	79
Royal Spoonbill	1	40	57
Mallard/Grey	16	43	174
Paradise Shelduck	26		26
Grey Teal			450
Black Swan		64	34
Canada Goose		180	85
Shoveler		17	
Pukeko		16	
Little Blue Penguin		1	
Fernbird			9
Bellbird			1
Banded Rail			1

Animal Pest Control

Maketu Spit

The year has been pretty normal, we did our usual bait station blitz on the distal end in July and August, the track cards at the end showed nil rats and nil mice – not a bad result. Though we know they will be back. Quite a bit of work was needed to repair the trapping fences, but that is to be expected, and the #1 fence, while it is being eroded on the harbour-side, needs extending on the beach side. We have three trapping fences with a total of 13 DOC 200 traps, the ones on the #2 and #3 fences are double set, ie critters can enter from either side of the fence. On the #1 fence next to the dotterel breeding area, they are all single set as we reckon that we do not have any critters in the distal end.

Table 6: Annual trapping results for Maketu Spit.

Maketu Spit	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Rat	2	6	6	14	11	13	15	24	91
Mouse	10	0	0	14	0	11	14	20	69
Mustelid	4	8	7	6	6	12	1	2	46
Hedgehog	7	1	10	12	4	3	0	2	39
Rabbit	0	0	2	1	0	0	0	0	3

Dotterel Point, Pukehina

In April, after a skink survey that found no skink, we realised that we had a problem, and so deployed 10 tracking tunnels. On recovering the trackpads we found that we had rats and hedgehogs in the area, so at the end of the month we installed 11 double set DOC 200 traps. Over the next month, we caught 6 rats, four of them very large, and 14 hedgehogs, several of which were clearly juvenile. Since the end of May we have caught no critters, so have removed the traps for use elsewhere. This is the first time that we have had a pest mammal problem at Dotterel Point, we are not quite sure why but it is certainly of concern and means that we will need to set out track-tunnels on a regular basis as there must be a population of hedgehogs further up the spit.

Newdicks Beach

We have reviewed and redistributed our DOC 200 and 250 traps at Newdicks. It appears that we have effectively reduced numbers at the Eastern Dune end (minimal catches recorded in the last 6 months). We set 18 tracking tunnels along the entire site in September. Results indicated rat, hedgehog and mustelid presence in the car park and bank zone. And just mice in the eastern dune showing the efficacy of our trapping there. 7 of the 9 DOC 200 and 250 traps from the eastern dune have been redistributed approx. 60-100m apart along the bank zone and car park area. Pohutukawas in the car park area have possum damage so we will set up some traps in the trees and a few down the bank zone too.

Table 7: Annual trapping results for Newdicks Beach EP (Eastern Dune only).

Newdicks Beach	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Rat	8	83	82	27	58	33	291
Mouse	5	6	3	1	4	1	20
Mustelid	5	19	7	0	8	3	42
Hedgehog	2	15	6	0	4	4	31
Possum	N/A	N/A	N/A	N//A	3	Nil	3

Waihi Harbour WMR – West

Trapping figures in this reserve show that we are having a significant effect, the figures for 2015/16 were lost, but we had over 20 possum and several ferret in that first year. We will never get numbers down to zero due to the adjacent farmland, but by keeping numbers down, just 35 kills this year compared to 131 in 16/17 and 62 in 17/18, will provide a much safer environment for native species to flourish in.

Table 8: Annual trapping results for Waihi Harbour WMR – West.

Waihi West	2016/17	2017/18	2018/19	Total
Rat	47	31	12	90
Mouse	17	7	1	25
Mustelid	38	10	12	60
Hedgehog	23	10	6	39
Cat	3	4	2	9
Possum	1	0	2	3

Waihi Harbour WMR – East

The Eastern side of the reserve shows a similar decline in numbers to the west, just 10 critters compared with 17 the previous year and 32 in 16/17. Obvious progress which we hope will show in an increase in wetland birds such as bittern, rails and crakes.

Table 9: Annual trapping results for Waihi Harbour WMR – West.

Waihi East	2016/17	2017/18	2018/19	Total
Rat	12	9	2	23
Mouse	5	4	0	9
Mustelid	10	2	5	17
Hedgehog	4	1	0	5
Cat	0	1	3	4
Possum	1	0	0	1

External Contracts

We have entered into a number of external contracts for two main reasons. Firstly, the organisation needs some additional funding for incidental expenses, and these contracts are a means to obtaining some unallocated funds. Secondly, our work gang needs more work. While the four BMPs that we run provide quite a lot of work, they do not provide even half-time work for our gang of up to six people. The more contracts we can take on, the better opportunities we can offer to our members who are part of the work gang.

Papahikahawai Island

We have not done any work on the island this past year, but have just developed a pest control programme with BOPRC which we shall be carrying out this year.

Whakpoukorero Wetland

Just prior to the end of the year, we were able to use some Environment Enhancement Funding (EEF) to clear a raised area partly covered in honeysuckle at the back of the Whakapoukorero wetland. We then planted up part of the area and hope to finish off the project this year, with additional funding from EEF.

Spartina

This was our second year working on the spartina eradication programme, *Spartina anglica* is an invasive grass that flourishes in estuary and harbour margins. It was introduced 30 years ago as part of a private land reclamation project, but it has been labelled an eradication weed and so the Regional Council is organising and funding an eradication programme. It is found along much of the southern margin of Maketu estuary, sometimes in large very dense patches, and it has also invaded the saltmarsh area, where it is hard to see in amongst the sea rush.

Last year we controlled some 80% of the area affected by spartina, this year we did a follow-up on all those areas, plus a further 15%, leaving just three small areas that still need to be dealt with. We also did more work in the saltmarsh which is the trickiest bit to deal with as the plants are only visible when you walk into the sea rush. A helicopter would be handy, but also expensive.

The plantings that we did last year were partially successful, there are a variety of problems associated with planting here, either because of the fairly anaerobic mud, or the thick felt-like root mat that builds up with spartina. We will be doing further work on this project in the coming year, two more years should see it all done!

Kaiate Falls

Kaiate falls are small but spectacular waterfalls in a deep narrow gorge at the back of Welcome Bay. They are a District Council reserve, and very popular, especially in summer, with swimmers. The track down is pretty steep with numerous sets of stairs. We were contracted to clean up the vegetation either side of the track, getting rid of pest plants such as gorse, asparagus fern and tradescantia. Most of the heavy work has been done, but it will require regular maintenance, probably on a twice yearly basis.

Midway Park, Pukehina

As its name suggests, Midway Park is halfway along the beach in Pukehina. It is a District Council reserve and lies on both sides of the road. On the southern side, there is a small wetland that has been developed over the years, but which has some serious weed problems. MOWS was contracted to get in there and deal with the invasive grasses, blackberry, pampas and other weeds. Again, this is an ongoing situation which will likely need dealing with twice yearly.

TALT Properties – Mowing

We did some work on a couple of Te Arawa Lakes Trust properties, and also signed an agreement to mow a number of un-occupied lots in Little Waihi and on Arawa Avenue. The contract is running well and we are hopeful that it will be expanded as more lots are vacated.

Environmental Education Programme

Our education programme continues to grow and evolve, this year we facilitated environmental learning for Maketu Kura, Paengaroa School, Te Puke Primary, Te Ranga, Pukehina, Pongakawa and Otamarakau Schools, as well as Te Puke Intermediate and almost every year level at Te Puke High School. We also partnered with Wild About NZ to run a wetland visit for Fairhaven School and had sessions with under 5's at Paengaroa Kindy, Learning Adventures and Maketu Educare. We are really seeing how inspired the kids are and the importance of the programme, many of the primary students we work with are choosing to join the new Eco Learning unit at Te Puke Intermediate.

The success of the programme is made possible thanks an amazing team of MOWS educators and our partnerships with Maketu Taiapure Trust, Bay Conservation Alliance and Learning Through Discovery. The schools in our catchment are very privileged to have funding from Western Bay of Plenty District Council, WWF, TECT and Baytrust.



Rocky shore and shorebirds talk at Maketu Educare.

Term Four 2018

We ended 2018 by celebrating the return of migrating Bar-Tailed Godwits to Maketu Estuary. In class students were amazing to learn about the different adaptations shorebirds, waders and forest birds have to eat different food. MOWS taxidermy collection makes for hands on learning experiences they will never forget. We teach the students about estuary ecosystems from algae right through to the shorebirds and fish that thrive here.



Left: Students from Te Kura o Maketu digging out a quadrat survey. Right: Te Puke Intermediate Eco Class measuring pipi with Whaea Elaine.

The field trips took students to Maketu Estuary where we joined Elaine Tapsell from Maketu Taiapure Trust to conduct a study of kaimoana/shellfish beds. This is an ongoing study conducted in November every year to assess the size and distribution of pipi, tuangi/cockles and other kaimoana in the estuary. Students had to complete a haphazard survey using a quadrat placed every 5m along a 30m transect line. Every living thing on the surface and down to 10cm depth was recorded and measured along with tide and weather

conditions. This data is going to be vital to assess the changes in shellfish abundance and distribution following the re-diversion works on the Kaituna River.

Following the sampling students explored the estuary and identified shorebirds such as NZ Dotterel, Bar-tailed Godwits and Oystercatchers. The final part of each trip was a BBQ lunch cooked by MOWS and a prize giving to acknowledge the students who stood out over the year. We had great turn out of parents to our final trips this year.



Left: Ornithologist Jenn Shephard leading Te Kura o Maketu students on a bird walk. Right: Prize winners from Paengaroa School.

International Students

In January 2019 we partnered with Rustic Pathways International to host a class of students from Hawaii. We showcased our rocky shore at Okurie and ate mussels on a fire then took them to the dune system at Pukehina spit and they pulled weeds for us, then we had a walk through the estuary to see shorebirds and mud crabs. They stayed for two nights at Whakaue Marae and we look forward to bringing more groups to Maketu in future.



Students from Hawaii weeding and learning about the importance of our dune systems in Pukehina.

Term One 2019

Te Kura o Maketu students from the middle and junior classes had an exciting month, learning about the creatures that live on our rocky coast. Due to the Rahui at Okurei we had an adventure to Mauao! The juniors explored Mauao base track and the rock pools below. They saw a NZ fur seal sun bathing, star fish, anemones and crabs. The middle class had an exciting trip to Moturiki (Leisure Island) and were amazed to hear that the island used to have a marine par aquarium on it with captive dolphins in pools from 1966-1981. The park closed down and the wild caught dolphins were released back to the sea. Our tamariki noticed that the rocks at Mauao are made from cooled magma with cracks running through caused by the waves and currents. They look very different to the ones at Maketu which are smaller boulders sent flying from eruptions at Thornton, Tarawera and Rotorua. Our follow up session was messy fun, making clay tiles with a rocky shore theme using shells and seaweed they found on their trips.



Photo left: Rocky shore discovery at Moturiki. Right: camouflage crab with sea weeds growing on it.

Paengaroa School students completed a rocky shore transect at Mauao, looking at the change in height and types of invertebrates as you move up the shore from low to high tide. Te Puke Primary "Future Force" were lucky to head to Okurei (Maketu Point) once the Rahui had lifted. They discovered octopus and other sea creatures and enjoyed completing a rocky shore transect.



Paengaroa School completing a rocky shore profile at Mauao.

By the end of term one the rahui around Okurei had lifted so Te Puke Primary were able to visit the rocky shore at Maketu. They found octopus and other amazing marine creatures and completed rocky shore profiles as well.

Our follow up session involved showing the students how to enter data in to excel to create tables and interactive graphs showing distribution of sea creatures along the rocky shore.

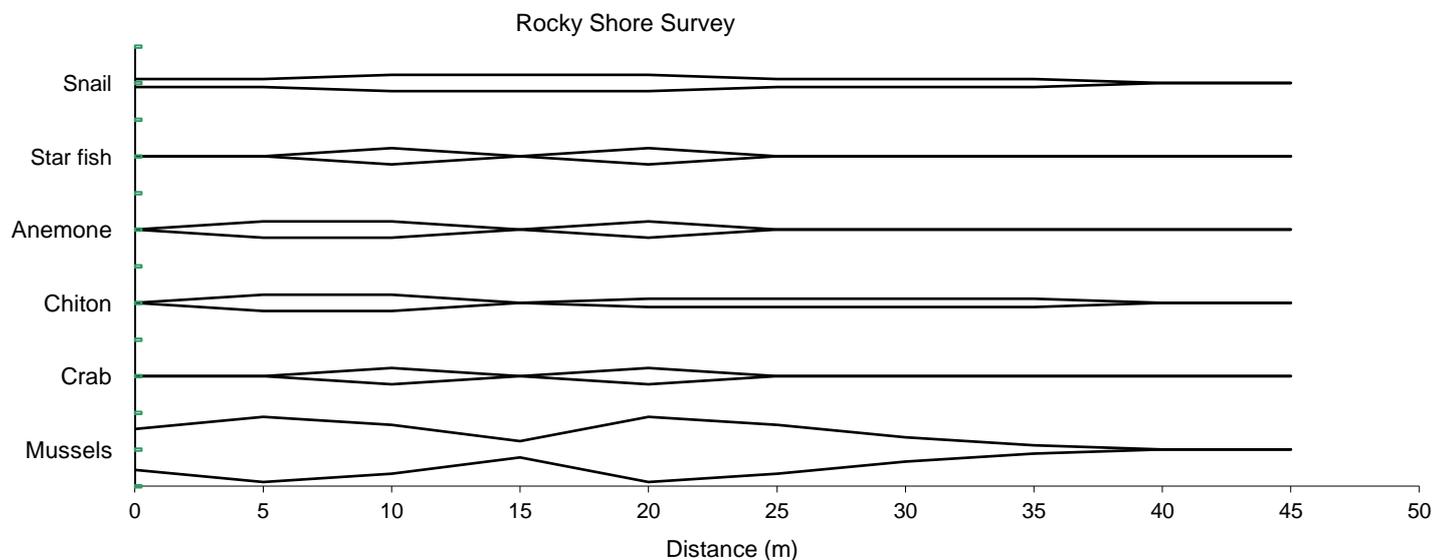


Figure 4: Kite graph showing invertebrate distribution from low to high tide mark.

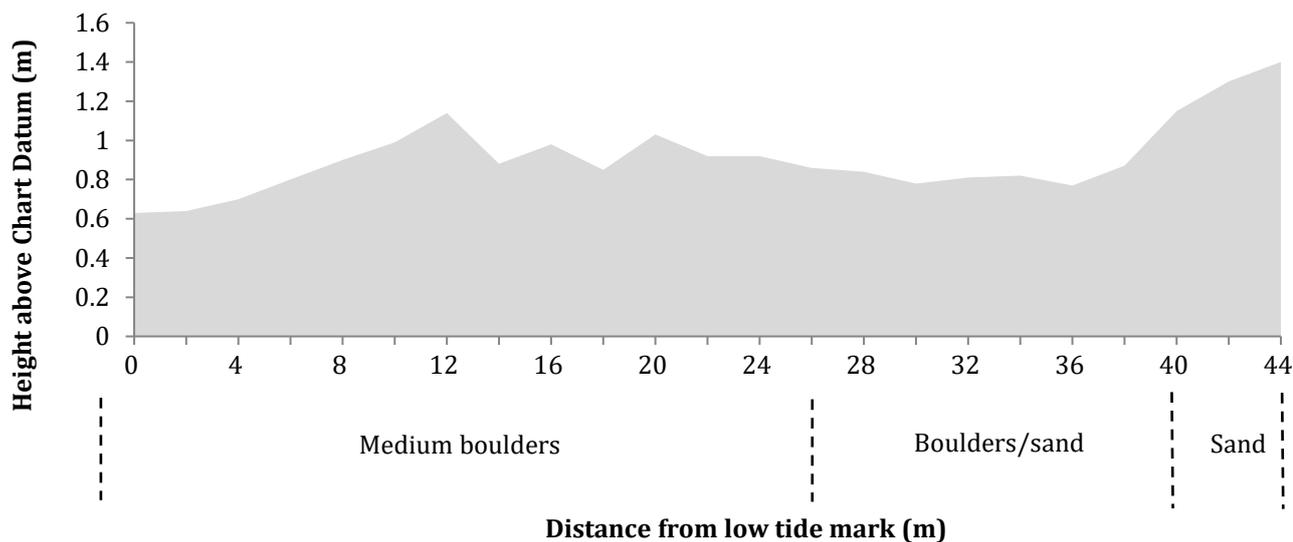


Figure 5: Rocky shore profile Okurei (Maketu Point) 100m East of Surf Club. Low tide 0.6m above chart datum.

Term Two 2019

Dune education was our key theme in term two. Students from 6 local schools learnt about the important role our dune ecosystems play in protecting our land from erosion and providing habitat for endangered birds and reptiles. We collaborated with Bay of Plenty Regional Council's Coast Care to deliver dune planting days in Pukehina and Maketu.

Te Kura o Maketu had a great day planting the dune at Newdicks Beach, they have seen great success with their planting sites here for the last 4 years. Some of their dunes have grown from nothing to over 2m tall and 4m wide!



Left: Tamariki from Pukehina School planting in Pukehina. Right: Tamariki from Te Kura o Maketu, planting the dunes at Newdicks beach.

Due to limited access to Maketu Spit Te Puke Intermediate, Te Ranga, Paengaroa, Pukehina and Te Puke Primary School all planted at Pukehina helping to restore coastal dune systems. Te Puke Primary also pulled out 1 tonne of ice plant from the Patara-Ngawhika Whanau Trust land at Poutuia reserve. Otamarakau School planted a section of dunes by the Otamarakau Overbridge.



Left: Tamariki artwork from Te Puke Primary in 2018. Right: Te Puke Primary "Future Force" weeding ice plant on the Patara-Ngawhika Whanau Trust land with Maureen Binns (MOWS Committee Member).

Term Three 2019

Tania's favourite subject is teaching the kids about how our land use impacts our soil, plants, rivers, estuaries and the moana. We highlight this by taking groups to the upper Kaikokopu stream at redwood Valley Farm in Paengaroa. The area has many springs feeding through the mountain from Lake Rotoiti, Redwood Valley Farm was deforested in the 60's and the stream banks replanted in the 80's. The secluded forest trails running along the stream banks showcase how all of our streams should look, with rocky riffles and beautiful clear water. Students complete a habitat assessment then look at the fish and invertebrate species as well as sediment and nutrients in the water.



Top: Pukehina School student experiencing the wonder at redwood Valley Farm. Bottom: Te Kura o Maketu students looking at freshwater invertebrates and tuna/eels.

We then take them on a journey downstream where they view the way the land use changes to forestry, farming and horticulture. In the lower catchment the streams turn from meandering to straight drains with stop banks in either side to protect the land from flooding. These areas used to be full of wetlands which filtered the water before it reached the estuary and moana. Students found that the nutrient and sediment levels doubled by the time the water reached the estuary. Due to a lack of wetlands the estuary is filling in with sediment and nutrient levels which cause algal blooms in summer. Little Waihi estuary has been identified as a priority catchment by BOPRC which means more resources will be put in to cleaning up the water.

Additional units

Thanks to funding from Bay Trust and TECT we have been able to continue expanding our programme to provide many schools in our catchment with environmental education. In March Tertiary students from Toi Ohomai Resource Management course came on a field trip to the two sites outlined above and were all very interested to see first-hand the impacts of our land use on the catchment.

Te Ranga School year 8 and 9 and the whole of Pukehina School also had a visit to Redwood Valley Farm and Little Waihi Estuary at MOWS/DOC site Waihi Harbour Management Reserve. Both Schools also planted in the dunes in term 2. Fairhaven School visited By de Ley wetland with Peter Ellery and Pongakawa School will be visiting the rocky shore at Maketu in term 4.



Te Ranga School year8 and 9 students at Waihi Harbour Wetland Surveying fish with Peter Ellery and invertebrates with Jamie Moko.

Fish surveys and snorkelling

The students from Paengaroa School, Te Kura o Maketu, Te Puke Primary and Te Puke Intermediate were very lucky to have an extra activity sponsored by TECT and BayTrust run in collaboration with Emma Richardson from Discovery Through Nature. Emma and Tania came to class and the students learned about reef fish and how to conduct an underwater marine survey using a transect line. Once they practiced in class we took them to the pool and taught them how to snorkel! By the end of the session they were diving under, clearing the water from their snorkels, identifying fish and writing on waterproof paper with their faces under water. We want to let all our tamariki know that they can be marine scientists one day if they want!



Te Puke High School

A year 11 class from Te Puke High School approached us to run a unit about wetlands to complement their study of the landing of Te Arawa waka in Maketu and the journey inland up the Kaituna River. We ran four activity rotations at Kaituna Management Reserve Wetland a) water quality testing comparing the farm drain to the outflow of the wetland, b) Invertebrate species living in the wetland and a habitat assessment, c) wetland walk to look at plant and bird species, d) pest animal trapping and fish and tuna/eel traps.

We also ran a class session about what MOWS does and an introduction to dune vegetation surveys with 180 year 10 students. Unfortunately we were not able to complete the field trip due to weather and a lack of rain dates available that worked for the school.

We were very privileged to run an awesome wetland restoration unit as an elective programme with 14 seniors at Te Puke High School. World Wildlife Fund NZ sponsored the project where students can earn Sustainability Credits by planning and planting a wetland restoration site. This project is a collaboration between Maketu Ongatoro Wetland Society, Te Puke High School, Department of Conservation, Fish and Game and Bay of Plenty Regional Council.

The project is almost complete and took part in 4 stages:

- Stage 1 – Wetland bioblitz – students assessed water quality (comparing farm drain adjacent the wetland to the wetland outflow), categorized freshwater invertebrates to assess habitat quality, checked fyke and minnow nets for freshwater fish and tuna (eels), took a walk to identify wetland plants, and measured out the site for planting/restoration.
- Stage 2 – Students researched wetland plant species and ordered plants from the nursery. Key factors they had to include: the budget for compost, plants and plant protection covers, number of plants needed to cover the site and which plants to use in boggy areas vs dryer ground.
- Stage 3 – Students planted 450 sedges, flax, kahikatea, mingmingi, kohuhu and cabbage trees. The vision for the site is to create beautiful a stand of kahikatea (NZ tallest tree) in 30 to 50 years. To view the planting site you can go to the wetland at the of Kaituna Road and Pah Road, and walk down the track through the gates. The planting is 20m away on your right.
- Stage 4 – Students wrote reports about why the restoration of NZ wetlands is so important and personal reflections about how this activity has impacted their thinking.



Te Puke High School senior students planting at Kaituna Management Reserve Wetland.

Events and promotion

Annual General Meeting “Breakfast with the Gulls” 2018

We had an AGM with a difference in November 2018, hosting the first “Breakfast with the Gulls” event. More than 60 people came to have breakfast cooked by our amazing volunteers and take a guided tour of the shorebird breeding colony on Maketu Spit. Excited attendees reported seeing black-billed gull and NZ Dotterel nests and chicks (both critically endangered species) as well as variable oystercatchers, white fronted terns and red billed gulls. We were very lucky to have the support of Maketu Surf Club who transported people across the channel and provided the venue for our AGM. The event was a great success and will be continued in years to come.



Photo top left: Red-billed gull nests and chicks. Right: Maketu Surf Club IRB crews Gibbo (John Gibson) and Manaia volunteering their time to ferry people across. Bottom left: Display stall with students from Te Puke Primary. Right: Volunteers Peggy Moncur and Laura Rae (Committee Member) cooking up a mean feed.

Publications, promotions and :

- Mai Maketu - monthly
- REEF Newsletter
- Newspapers – one article per term for core 3 schools plus additional articles of education with Te Puke High School.
- School newsletters
- Te Puke Library display
- 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. We are now over 500 Likes on Facebook.

- Updated website
- Stalls at Maketu Markets, Welcome to the Bay Expo, Maketu Community Showcase, Pukehina School Expo, Te Puke Community Expo and Te Puke A&P show.



From left: Claire Hartley (Membership Coordinator) who was hapu in this photo and now has a lovely baby girl, Tania Bramley (Secretary and Education Coordinator) and Carolyn Symmans (Pest Control Officer) at Te Puke A & P show stall January 2019. Right: Queen Rat Catcher educating tamariki at Maketu Market.

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 parents evenings and prize giving's 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 10: MOWS volunteer contributions by category June 2018- June 2019

	Number of volunteers	Volunteer hours
Management of membership	2	15
Sourcing funding	3	58
Accounting	4	102
Travel	12	263
Promotion - facebook, website, newsletters	3	28
Meetings	12	59
Emails	12	316
Reports	4	97
Set up and clean up on all work days	6	696
Market days	4	43
AGM Breakfast with the Gulls	12	58
Education - support for field trip days	15	360
Education - dune planting days x 6	268	450
Machinery and workshop maintenance	2	19
Biodiversity monitoring	5	116
Working bees x 11	233	607
Trapping pests	3	306
Total	588	3516

Little Waihi Community Care Group

Tania and MOWS member Wendy Rapana have been instrumental in setting up an environmental group in Little Waihi village. They are now recognised as a care group with BOPRC and their aims are to control pest animals and plants in the village and on Bledisloe Park, as well as planting around the estuary margins. This kaupapa is encouraged by TALT, Predator Free BOP and MOWS have supported their working bees over 2018-19. In time we hope to work alongside TALT, BOPRC and the Little Waihi Care Group to start looking after the Islands in the estuary.



Top Left: Cleaning up the estuary margin of section 9 Pipi lane. Right: Jesse and Rim planting the first flax. Bottom: Building rat trap boxes for the whole village with the support of Predator Free BOP.

Submissions and community representation

MOWS has continued to play an active part in the Community water Groups for both the Kaituna catchment and the Pongakawa Waitahanui catchments. These groups have been helping Regional Council work out plans for freshwater use and cleanliness. Matters have been on hold for some six months, pending the announcement of a new national government document 'Action for healthy waterways' which was issued in September 2019.

Member Training, Courses and Conferences

- First Aid – With an increasing emphasis on Health and Safety, five of our members refreshed their first aid skills at a day long training session in Rotorua, run by Peak Safety, and organisation that specialises in courses related to the outdoors, possibly more relevant to our work than courses more focussed on indoor work.
- Growsafe – Now that the approved handlers cert no longer exists we sent two members to complete Growsafe training for herbicide use.
- Conferences – Symposia - Julian and Sheelagh attended the Coastal Restoration Trust Conference (previously The Dunes Trust) in Warkworth in March, the theme was 'Living with dynamic shorelines' we certainly have that here especially with two sandspits that are forever changing and creating challenges. We have been attending this conference for a number of years and it is always valuable as you see coastal problems and solutions in different parts of the country, next year it is Southland. This has become more valuable as a meeting since they broadened the remit of the trust, and links us to a variety of other groups and organisation, including councils, working in the same area.

MOWS Base of Operations

The shed has now been in operation for over a year but is yet another example of that variation in Parkinson's law – however much space you have, you will inevitably end up with more stuff than it can handle! No sooner had we transferred everything into the new shed, than we realised that for health and safety we needed *another* shed, this time to store the herbicides that we use in our various projects. After looking at a number of options, we settled on a very nifty small 'container' called Best of Steel or BOS for short. These are made in Germany from galvanised steel and are remarkable in being able to be erected very quickly – just 2 man hours! They arrive flat packed and clip together, our model had two bolts, but some models have no bolts at all.

However no sooner had we erected this that council came along and said we had to make various additions or modifications to comply with health and safety regulations, they helped us through these, and then the government changed the H&S regulations so that we now need another extra shed to store our fuels. We are in the process of erecting a second identical shed alongside the first one. Our thanks to Sheelagh Leary for a donation that made the first BOS shed a possibility, and to Regional and District councils for donations that made the second shed possible – topped up by funding from TECT.



Bay Conservation Alliance

MOWS is a founder member of Bay Conservation Alliance (BCA), and was instrumental in getting this new organisation over the line. BCA employed Michelle Elborn as Chief Executive in September 2017. During her first year she was very focussed on laying foundations, developing relationships and building alliances. This culminated in September 2018 with a launch event in Tauranga with the keynote speech being given by the Minister for Conservation the Hon. Eugenie Sage. This was a real milestone as it was well attended with 3 local mayors and an MP in the audience. It gave BCA a degree of visibility that would be hard to obtain in any other way.



Bay Conservation Alliance chief executive Michelle Elborn (right) with the Minister of Conservation Eugenie Sage at the BCA launch last year. Photo NZ Herald.

At the time of the launch BCA had increased membership from the original four groups, to six, and in the period since the launch that has grown to 11. Especially interesting is that BCA now have members in Kawerau and Rotorua, and they are not all community conservation groups. The Aongatete Outdoor Education Centre has joined, as has the Animal Rescue and Rehabilitation Centre (ARRC) Wildlife Trust. BCA has also been heavily involved in helping to develop the Manaaki Kaimai Mamaku project. This has huge potential but is also immensely complex as quite apart from 21 Iwi having interests in the area, there is DOC and half a dozen councils who are affected, along with a significant number of communities and other interested parties around the Kaimai Mamaku Ranges. While given the complexities and scale of this project there are challenges to navigate, we are hopeful that BCA will play a significant and meaningful role in ridding the Kaimai ranges of pests!

Anyone who has had anything to do with running a small community group, will know the pain caused by funding. Filling in applications, waiting long periods for a result, receiving nothing or a significantly reduced amount. The system is quite simply not fit for purpose, as not only does it put a huge strain on small largely voluntary groups with minimal resources, but it also puts pressure and costs onto the funding organisations who have to be careful not to use too much of their available funding on the awards process. With this in mind BCA approached two of our funders, TECT and Baytrust to see if we could improve the system, and they said YES! This has born fruit, admittedly in the current financial year, with MOWS and six other organisations being allocated funding by TECT for 2020 and 2021, with just one application handled by BCA. We expect to hear shortly regarding our application via BCA, to Baytrust. Now to get national funders like DOC, MfE and WWF to see the light!

Plans for the future

As our operations continue to expand and grow we look forward to continuing to protect and enhance the native biodiversity of Maketu and Little Waihi estuaries and catchments. We need to look towards the future and plan for the ongoing creation and management of projects. A common problem with virtually all community groups, is that there is only so much that you can achieve on a voluntary basis. This is one of the reasons we decided to take the social enterprise route to try and make MOWS more sustainable into the future. Fortunately, our funders and supporters have understood what we have been trying to do and have helped us along the way.

We are now looking to manage another stage in the process, that of spreading the load and passing the management responsibilities on to our younger members. In 2018 one of our committee members Will Anaru, was able to take on the role of External Contracts Manager (working with different clients, working out costs and quotes and supervising the execution of the contracts). Will left at the end of 2018 and this role fell onto the Chair, Julian Fitter's shoulders, which already had quite a lot to bear. Knowing that overwork tends to produce poor results, Julian has now passed that role on to Tania Bramley, our Secretary, manager of Newdicks BMP and the Education Programme. Luckily we also have an amazing well trained education team who will be able to step up and lighten the teaching load for Tania in years to come.

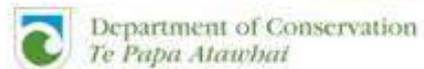
Julian has also started to pass on responsibility for our Dotterel Point project to Laura Rae. Laura joined us in 2018 but has shown a lot of enthusiasm in her work and has been a quick learner. We look forward to continuing to train Laura to be able to manage multiple sites in the future.

We have an amazing array of skillsets in our ever growing and passionate team as well as a long list of supporters and funders who we can work with to continue to improve our goals going forward.

Thank you for reading our annual report for 2019,
Nga mihi nui,
MOWS Committee



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



**WILDLIFE CONSERVATION / RESTORATION / EDUCATION
ECOLOGICAL MONITORING / COMMUNITY ENGAGEMENT**

