



MAKETU ONGATORO WETLAND SOCIETY

ANNUAL REPORT

2021



Chair report

It is now 12 years since we started work on Maketu Spit, and a lot has changed, mostly for the better. The past year has been a particularly significant and challenging year for us, both on the management and delivery fronts. You could say that MOWS grew up. All work was voluntary when we started, but as the size of the task grew it became too much work for just volunteers, so with our funding we started paying contractors. Then we thought, why pay out significant sums to contractors from Tauranga, when we could do that work ourselves, and get paid for it and benefit the local community financially. So we started working as part-time contractors, and from there, the logical step was to start actually employing local people to do the work.

In July 2020, we took the big step and brought on board our first permanent employee, Laura Rae. Laura had been working for us on a casual basis since 2018, but now, instead of a variable income, she would receive a regular weekly pay package, be able to open a Kiwisaver account and have the benefits of sick leave and holiday pay. The experiment worked so well that in September we advertised for a second employee and hired Awhina Awhimate from Otamarakau to work with Laura.

At the same time, in far-away Tauranga, our support organisation, Bay Conservation Alliance won a contract with MfE to develop a 12-week training course, Bay Conservation Cadets, for people who wanted to re-train or upskill to work in conservation. One of our volunteers, Raven Nicholas, expressed interest in the course and we supported her application. She was selected for the second intake in May - August, after which we hired her as well - so now we have a work crew of 3.

Meanwhile, things were also changing on the management front. Tania Bramley, our Secretary and developer of our Education Programme had indicated she was leaving over the course of the year, and I also felt it was time for me to step back and be less involved in day to day operations. Fortunately, we had two candidates waiting in the wings! Janie Stevenson has been a long-time member and was working for Landcare Trust. We persuaded her to take over the role of Secretary, and then, working with Bay Conservation, to also pick up the Education Programme. On the operational front, Jenn Sheppard had been working with us since 2018, helping with monitoring and education. She agreed to take over most of my role in running our four Environment programmes.

In just 12 months we managed a significant management changeover and a workforce expansion. We have agreed that, assuming funding permits, Jenn will become a full-time employee in January 2022. Meanwhile, I have become 'the maintenance man' and in charge of new contracts. This is not intended to be long-term, and it is probably about time we started looking for a new Chair!

I am pretty chuffed that we have grown and made changes. One reason I set up Bay Conservation was to move away from a purely volunteer based model, the task is far too large and complex for just volunteers - would you consider building Skytower with volunteer management? No, we must be serious about this, as we must be serious about the implications of climate change and the need to clean up our environment. Yes we need volunteers, but we cannot expect them to do the donkey work, we must be rational and make sure it is done professionally. Happily, our funders, especially TECT and Baytrust have been very supportive of what we are trying to achieve.

Julian Fitter – Chair

Cover photo: Red-billed gulls at Maketu Spit

Credit: Jack Preston (www.cinemaliawildlifeproductions.com)



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About us

Our mission

To protect, preserve and enhance the natural environment

Maketū Ōngātoro Wetland Society (MOWS) was established in 2008 when members of the local community came together to protect the colony of New Zealand dotterel¹ that breed on the distal end of Maketū Spit.

Since then, MOWS has expanded and now the Society focuses on biosecurity and restoration at several ecologically significant areas in the western Bay of Plenty that extends from the lower Kaituna River to Waihi Estuary, including Maketū Spit, Newdick's Beach, Dotterel Point Pukehina, Te Huauri o Te Kawa wetland, the Waihi Estuary Wildlife Management Reserve, and adjacent Pukehina Esplanade Reserve.

MOWS is comprised of three branches:

1. A biosecurity and restoration team of full-time employees and contractors that carries out the Environmental Programme work and biodiversity monitoring at our key areas, as well as several contracts in the area and beyond. Volunteers assist with conservation efforts when needed.
2. A successful education program that is run by the education team of employees, contractors, and volunteers to deliver a range of ecology and conservation related topics to local schools.
3. A contract department that handles contract work on non-core projects which helps to provide additional funding for maintenance and other expenses.
4. A support team of committee members and volunteers who continue to guide the efforts of MOWS and assist with events and working bees.



New Zealand dotterel at Maketu Spit

Photo credit: Jack Preston (www.cinemaliawildlifeproductions.com)

¹ See Table 1 in the Appendix for English, Māori Scientific name and conservation status of birds

Our aims

To support and encourage the conservation and restoration of the Lower Kaituna River, Maketu and Waihi Estuaries and their associated wetlands

Our objectives

In alignment with our mission of protecting, preserving, and enhancing the natural environment, the primary objectives of the Maketu Ongatoro Wetland Society are as follows:

1. Protecting, monitoring, and ensuring the breeding success of NZ dotterel², red-billed gull, black-billed gull, variable oystercatcher and other native species on Maketū Spit
2. Protecting, monitoring, and ensuring the breeding success of NZ dotterel and variable oystercatcher on Dotterel Point, Pukehina
3. Protecting and monitoring populations of migrant arctic and NZ shorebirds that use both estuaries, notably bar-tailed godwit, red knot, pacific golden plover, banded dotterel and royal spoonbill
4. Enhancing and improving visitor experience and sustainability of Newdick's Beach and Okurei Point, Maketū by helping the natural beach building processes to develop and by removing alien weed species and planting natives
5. Restoring the natural biodiversity of the Waihi Estuary Wildlife Management Reserve with particular reference to the critically endangered Australasian bittern, and at-risk spotless crane, marsh crane, banded rail and fernbird
6. Developing, organizing, and executing a comprehensive mammalian pest and alien plant control program for our areas of interest
7. Establishing a comprehensive survey of the ecology of the region together with ongoing monitoring
8. Expanding our education programme to include four local primary schools, Te Puke Intermediate School and Te Puke High School
9. Working with other local community groups to establish Bay Conservation Alliance with the intent of supporting, expanding and ensuring the sustainability of our conservation and restoration work
10. Developing our science and monitoring programme to make best use of the data that we collect as a tool for developing improved management plans in the future

Our services

We offer a range of services in environmental conservation, delivered by friendly, reliable, qualified, and experienced staff. Our services include:

1. Animal pest control
2. Pest plant control
3. Planting and plant maintenance
4. Ecological monitoring
5. Infrastructure, fencing and site maintenance
6. Community and school education

² See Table 1 in the Appendix for English, Māori Scientific name and conservation status of birds

Our works

The bulk of our work focuses on delivering four Environmental Programmes or EPs (previously referred to as Biodiversity Monitoring Plans; BMPs) supported by the Bay of Plenty Regional Council, Western Bay of Plenty District Council and the Department of Conservation. We also manage a fifth EP with Maketu Taiapure. Through these EPs, MOWS is mandated to deliver animal and pest plant control and ecological restoration and monitoring.

Maketu Spit

Maketu Spit comprises 45 ha of coastal duneland that extends 3.5 km from the end of Ford Road/Kaituna Cut to the mouth of the Maketū estuary. The EP aims to restore the ecological integrity of the Spit as habitat for threatened species and to maintain its important coastal ecosystem function.

This past financial year saw the 10th year of an EP programme at Maketū Spit. The main objective of the EP is to: i) maintain rodent populations to less than 5% detection rate via tracking tunnel index; ii) maintain mustelid and hedgehogs density to zero around the breeding colony; iii) reduce pest plants to very low levels or zero densities; iv) continue environmental education programmes.

To achieve objective one, a dense grid of bait stations are set out each July-Sept along the Spit to target rodent populations. Tracking tunnel detection rates of rats and mice following 4.5 weeks of bait station refills in the breeding colony (Area 1) indicated 0% detection of rats and 9% detection of mice (3 out of 31 tunnels).



Bait station and tracking tunnel at Maketu Spit

Objective two is achieved by fortnightly checking the network of 18 DOC200's located along the three predator fences which transverse the Spit. During 456 trap checks, we captured 23 rats, 3 stoats, 1 weasel and 0 hedgehogs, indicating very low densities of rats, mustelids and hedgehogs.

Pest plants are maintained in low numbers and regularly targeted throughout the year. Much of the focus is on Italian buckthorn³, tree lupin, purple and gravel groundsel, dimorphotheca and wildling pine. In 2020/2021, the work crew spent over 27 days and 193 workforce hours hand-pulling weeds or using over 101 liters of agrichemical spray to target the noxious weeds.

Dune Profiling

Each year, in conjunction with the Regional Council, we measure the profile (slope and shape) of the dune at its narrowest point. Work is done quarterly and has been on-going since 2015. If the sea were to break through at this point, it could jeopardise all of the gains we have made in protecting the breeding birds at the distal or eastern end of the spit. Results indicate that the Spit is eroding on the harbourside, but accreting (growing) on the ocean side.



BOPRC staff member and Laura surveying the dune profile in April 2021.

³ See Table 2 in the Appendix for English, Māori, Scientific name and conservation status of plants

Dotterel Point

Dotterel Point, Pukehina is a coastal dune that extends from the surf club at the end of Pukehina Parade to the mouth of the Waihi Estuary entrance. The EP aims to restore the ecological integrity of Dotterel Point as habitat for threatened species and to maintain its important coastal ecosystem function.

2020/2021 was the 7th year of work under the EP. The two main objectives of this EP are to: i) promote indigenous vegetation and control and eradicate pest plant species, and; ii) provide ongoing breeding success of the native plants and animals including NZ dotterel, variable oystercatcher and shore skink.

Over the past year, most of the work at Dotterel Point focused on ecological monitoring or animal pest control. In response to low skink captures in November 2021, 15 tracking tunnels were set out in mid-December; detection of hedgehog, rat and mice was 53%, 27% and 7%, respectively. This was lower than the 81% detection of hedgehogs recorded a year previously, following which 13 were trapped during summer 2020. But hedgehogs are very worrisome because they eat bird eggs, skinks and invertebrates, so in response, 12 DOC 200's were set out and have remained in place since, with additional traps added to make a current total of 24. From January-June 2021, 7 hedgehogs, 5 rats and 1 weasel were captured.

Over the past year, the team spent 5 days and 26 hours on pest plant control. African ice plant, montbretia, tree lupin, yucca, and pampas all present problems in the area and the team constantly battles these weeds. We have a semi-permanent rope fence around the breeding area which needs regular maintenance as the shape of the spit changes all the time. Once or twice a year our crew can be found re-shaping the fence. This can be quite minor, but in July we had to relocate three quarters of the fence due to erosion. Sometimes we have the opposite problem where accretion will bury the posts and they'll disappear. Following the erosion in July, we found one post that had been completely buried for quite some time and was still too difficult to remove - however with the sea you just have to wait and it will do the job for you.

We believe that Dotterel Point is the BEST example of dune restoration work in the BOP. When we started restoration of the area in 2014, the distal end had no vegetation apart from a few sea radish and the sea regularly washed over the spit. By excluding people, and especially quad bikes, we have allowed the native sand-binding plants to do their job and we now have a dune which is 3-4 m in height. Another impressive example of just allowing native species to do their job.



Fence repair at Dotterel Point following a large erosion event this past winter.

Newdick's Beach

Newdick's Beach is an area of coastal cliffs, duneland and beach located east of Okurei Point, Maketu. The protection area runs from the Newdicks Beach car park along the cliff bay to the mouth of Waihi Estuary. 2020/2021 was the 6th year of the EP for Newdick's Beach. Specific objectives of this EP include: i) protecting indigenous vegetation on the dune system through control and eradication of pest plants and addition of native plants; ii) involving the Maketu community via education, awareness campaigns and volunteer days; iii) securing the native biodiversity contained within the site from extinction.

During this past year, the work crew spent 11 days and 136 workforce hours targeting pest plants at Newdick's Beach. The majority of this work focused on cutting and pasting boneseed which has spread along the steep cliff-face, but other work also included removing three pine trees and focusing on tree lupin, moth plant, gorse, kikuyu, and cactus.

Our pest control officer, Carolyn Symmonds spends a lot of time volunteering and checking traps at Newdick's Beach. Over the past financial year, she captured 9 rats and 4 hedgehogs.



The large amount of boneseed prior to removal by MOWS personnel (above) and one of several rats trapped this year by our pest control officer.



Waihi Wetland

The Waihi Estuary Wildlife Management Reserve is a 45 ha DOC wetland located on the south side of Waihi Estuary. It is identified as an Indigenous Biodiversity Area A, which is the highest status available in the BOP, and also a Significant Ecological Feature for Western Bay. Our main objectives here are to: i) maintain or increase native bird populations in the saltmarsh area through animal pest control; ii) facilitate regeneration of indigenous vegetation through pest plant control; iii) maintain indigenous dominance of vegetation in the saltmarsh; iv) restore riparian and white spawning habitat within the Wharere Canal marginal strip.

The wetland is bounded on the west by the Wharere and Kaikokopu streams and on the east by the Pukehina stream and the Pukehina Esplanade Reserve. The reserve is divided in two by the Pongakawa Stream. The eastern section is a saltmarsh backed by a stopbank, while the western section has a freshwater wetland to the south separated by a low causeway for the saltmarsh to the north, with stopbanks on either side. Australasian bittern and fernbird are common throughout.

On the east side, our work focuses on weed and pest control. We have a policy of no-planting, this was partly driven by the nature of the substrate which is largely dredgings from the Pukehina Stream and unfertile. We have allowed bracken and rushes to take over while controlling pampas, gorse, bramble and inkweed. This has worked well with several natives developing naturally, one large cabbage tree has at least a dozen offspring and there are a number of flaxes. An excellent example of allowing nature to do the job - just keep the weeds out!!

On the west side, our focus in the saltmarsh and wetland is on weed control, while on the stopbanks and causeway we do weed and pest control and have planted a significant number of native trees, shrubs and ferns since 2015. Spotless crane are also present here and ruru and bellbird have also been observed. An important native plant, *Thyridia repens* (native musk) is found here and is a focus of our management of the freshwater wetland area. In the past year, we have started removing willows from the southeastern corner as they create difficulties for us to properly control glyceria, a seriously invasive grass.



MOWS work crew and volunteers planting *Bolbochenus* and other estuarine plants along canals.

In the past financial year, we increased our network of traps and now have around 40 traps throughout the wetland, catching over 78 rats, 11 mice, 17 stoats, 21 weasels, 6 ferrets, 15 hedgehogs, 2 cats, and 5 possums. From July-June, the work crew has spent at least 195 hours of pest plant control on the west side and 61 hours on the eastern side, collectively spraying over 1000 litres of agrichemical spray and hand-weeding, cutting and pasting hundreds of plants.

The project site was also enlarged in 2020 by the addition of the 800 m access stopbank, which runs from the end of Wharere Road to the Pump House. Previously this had been leased to the neighbouring farmer but is now part of the reserve, the big advantage of this is that we no longer have to navigate electric fences, cowshit or very large bulls! Definitely an improvement! Planting along this was done by volunteers working with Sustainable Coastlines and we are now able to mow t on a regular basis.



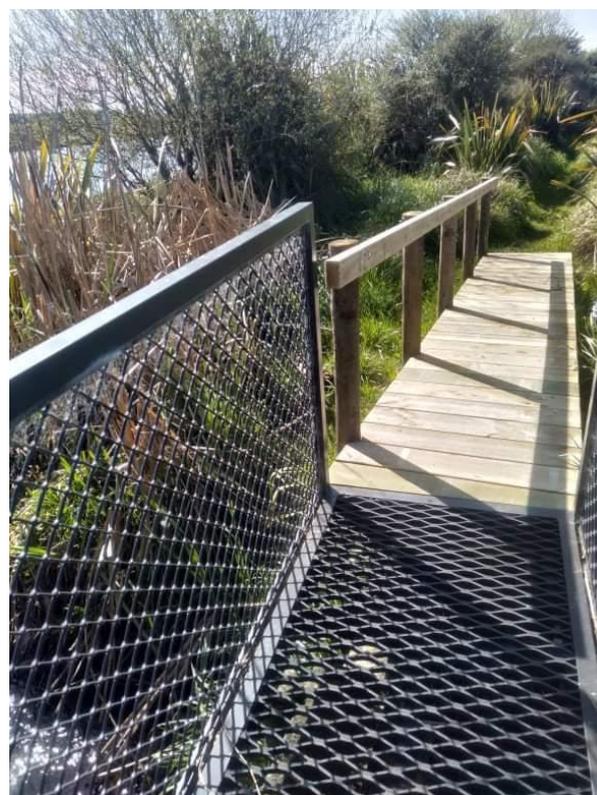
BCA cadets Misty Peni and Shane Gregory with possum at Waihi East (top) and a map showing our network of traps throughout Waihi wetland, including the new area of the stopbank and Pukehina Esplanade Reserve (bottom).

Te Huauri o te Kawa

This is a Maketu Taiapure project developed by one of our longest serving members, Peter Ellery. We are in the second year of the EP at Te Huauri o te Kawa (formerly the Borrow Pits and By de Lay). The 7.5 ha wetland is a priority 2 biodiversity site due to inanga spawning habitat. The main objectives of this EP is to: i) protect and enhance the inanga (*Galaxius maculatus*) population by maintaining and enhancing spawning and rearing habitat; and ii) protect and enhance the surrounding wetland habitat for broader ecological values by undertaking terrestrial and aquatic weed control, predator control and planting.

In February, the project was awarded an Environmental Enhancement Fund grant from BOPRC which allowed us to install new and much safer bridges, and to lay hardcore on most of the main track which can get very muddy.

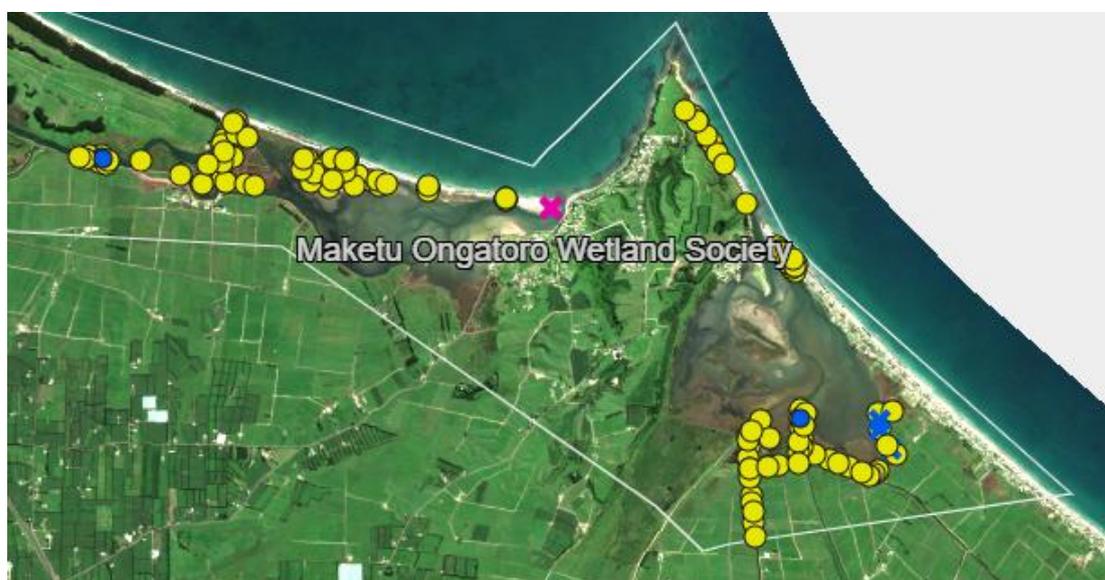
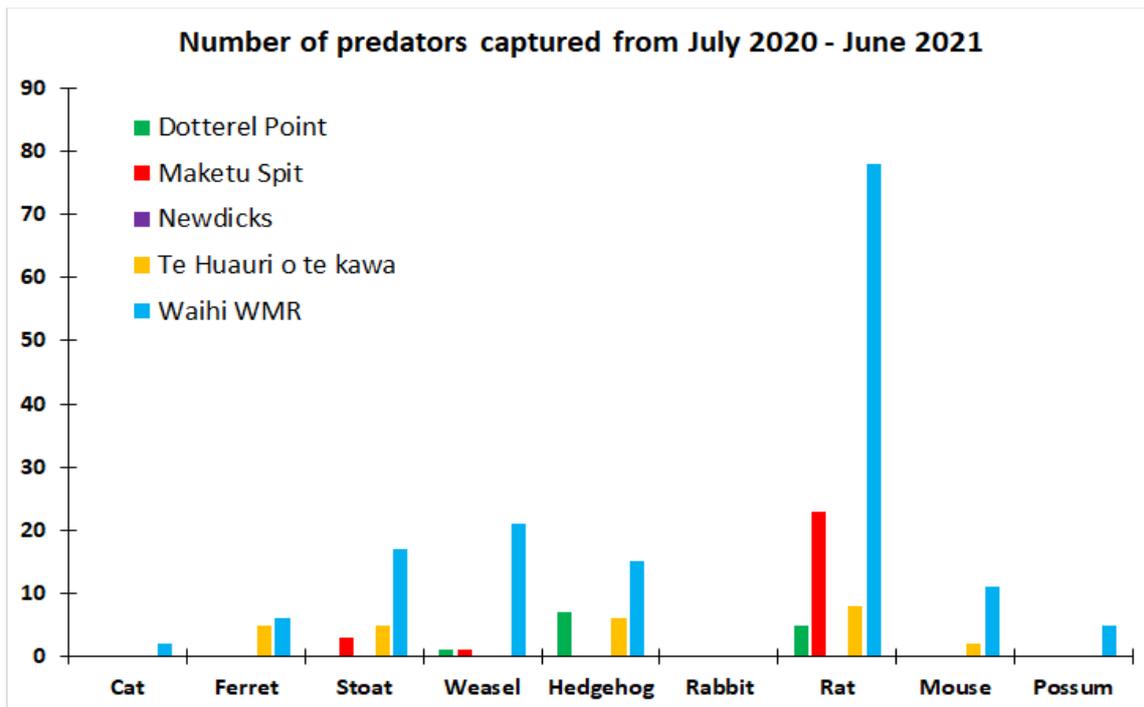
Over the past financial year, the work crew spent 108 hours controlling pest plants mainly focusing on Japanese honeysuckle, glyceria, pampas and gorse. The trap grid of 6 traps was increased to 9 total, and 5 ferrets, 5 stoats, 6 hedgehogs, 8 rats, and 1 mouse were trapped.



New infrastructure at the wetland as part of the EEF (above) and a view of the main inanga pond (left).

Animal pest control

Our staff and volunteers spend a lot of time checking and maintaining our network of 157 traps, including 142 DOC 200's. From July 2020 - June 2021, over 410 hours were spent checking traps or re-baiting and checking our network of around 700 bait stations. Rats are the most commonly caught predator across all our sites, but we are excited when mustelids and other predators are also captured. It's not uncommon for us to have double catches in our double DOC 200's. This past year we have recorded over 233 catches throughout our 5 EP's. In late June, most of the staff and volunteers started using an app developed by BOPRC to map and enter our trap locations and trap catch information. This will make for easy analysis in future years.



Screenshot from the dashboard of the BOPRC Care Group App displaying all our trap locations.

Pest plant control

While our control of pest animals is an important part of our work, we are equally focussed on the eradication or control of pest plants. In the open dunelands and sand spurs where most of our work takes place, these are at least as great a threat to our native biodiversity as the animals. Weeds have the ability to change the ecology of an area, destroying breeding habitat, depriving native species of food and often being a greater fire risk. Native invertebrates, on which many native vertebrates depend, generally prefer native plant species.

Some weeds are relatively easy to control, such as tree lupin, gorse, cape daisy, inkweed, they reproduce largely by seed, they can be sprayed on a regular basis and gradually eradicated. Others with windborne seeds, such as pampas and purple groundsel are a bit trickier as seeds will come from outside your area, which emphasises the importance of having regional or national programmes of weed control. The real problem weeds tend to be those that spread underground or have corms or bulbs,, such as sea couch, montbretia, oxalis. These are very tricky to deal with and need a long-term strategy to deal with, they can sometimes be controlled by planting trees or shrubs which will shade them out over time.

Over 650 workforce hours were spent on controlling pest plants this past financial year and we are proud of the hard work and dedication of our team.



Pampas at Pukehina Esplanade Reserve which the MOWS team worked very hard to remove.



Flowing gorse at a neighbouring site. Such instances are disheartening to the team when they spend so many hours controlling these weeds, only to have their seeds blow back into our EP areas. We look forward to securing additional pest plant control contracts that will enable us to combat this issue.

Planting

Over the years MOWS has planted many thousands of plants, not always with 100% success. In fact, one of the frustrations of planting is that at times you can get 100% failure for no obvious reason. For that reason, over the years we have developed policies and practices to help ensure that when we plant, it is the best solution, and that we have a high rate of success.

Ideally, you allow native plants to regenerate naturally, once you have a few native plants in an area, then natural processes can take over quite quickly. This is not always possible, so that a degree of planting is required, but it is surprisingly easy to overplant, and you underestimate the amount of space some of the plants need. Plants are commonly planted 2 m or less apart, and yet most of the native trees and shrubs will spread out 3-4 m or more. Overplanting just costs more and results in access issues further down the track.

One area of planting that we are working on the Pongakawa stream, where there is some quite serious erosion, we have started experimenting with a native sedge, *Bolboschoenus fluviatilis* to try and halt this erosion, first signs are that it is working, but it will be a long process as the banks appear to be eroding for no very obvious reason.

We did some additional planting at our other sites, the dune ones in conjunction with CoastCare, and we had a group organised by Sustainable Coastlines who planted up the access stopbank at the Waihi Harbour Wetland, more than 2000 plants were used, with DOC staff helping to finish the job off.



Fairhaven school participating with MOWS and Coast Care to plant sand-binding plants at Pukehina.

Newly planted plants on Ford Island, planted to reduce erosion that is largely resulting from boatwash.



Ecological monitoring

MOWS has conducted fortnightly counts of breeding birds at Maketu Spit since 2009 and Dotterel Point, Pukehina since 2011. Approximately 12 surveys are conducted from late August to late January usually during high tide.

During these counts, the number of every bird observed is counted but the primary focus is on northern NZ dotterel and variable oystercatchers. At Maketu Spit, nesting red-billed gulls, black-billed gulls and white-fronted terns are also counted.

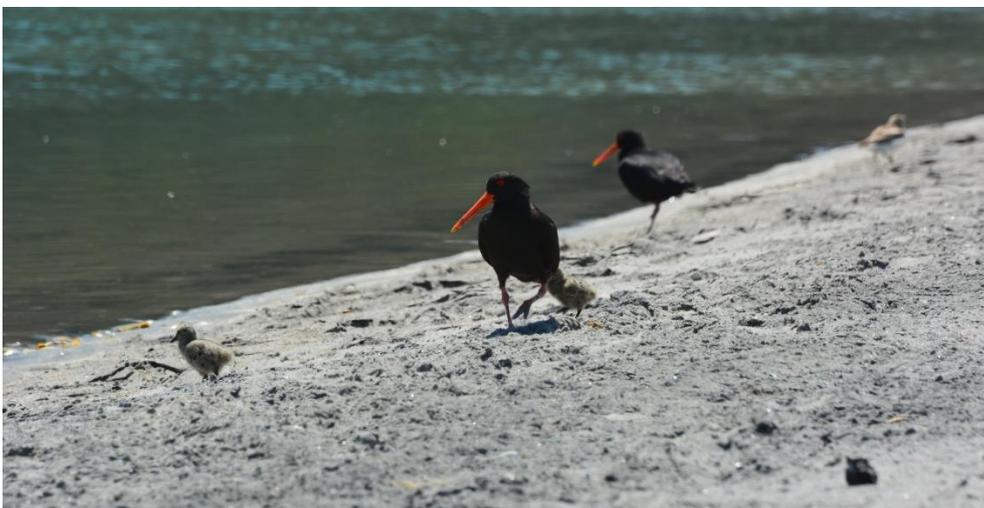
Dotterel and Oystercatchers⁴

Monitoring at Maketu Spit began 30 August and finished 20 February and was conducted by Jenn. Early in the season, up to 47 dotterel were observed on the Spit, but over 10 visits during the breeding season (late-Aug to Jan) an average of 29 birds, or 14-15 pairs were observed. Eight individuals with different band combinations were also recorded. A maximum number of 55 variable oystercatchers were recorded in late January (two were chicks), but peak breeding count averaged 39, suggesting 19-20 breeding pairs.

For the past 5 years, numbers of dotterels have averaged 25-30 individuals, and although this is an impressive increase from 11 birds in 2009 it does appear that population growth may have stalled. Similarly, numbers of oystercatchers have fluctuated from 39-49 during the same period, increasing from 19 in 2009, but whether the population is truly increasing now is questionable.

Possibly, the distal end of the Spit, which is just under 5 ha, is only large enough to accommodate this many birds. Alternatively, large numbers of gulls may prevent additional pairs from choosing to breed in the area. We are hoping to further investigate recruitment and productivity over the next few years to understand what is driving breeding bird numbers at Maketu Spit.

Julian monitored Dotterel Point from 30 August 2020 to 29 November 2020. Due to the smaller size, less grass and less birds, Dotterel Point is easier to count than Maketu Spit and we have more confidence in these counts, which is reflected in the smaller standard deviations associated with the averages. In 2012, there were 13 NZ dotterel, or 6-7 pairs, but this number has steadily increased and last year saw the highest average recorded number of 35 dotterel or 17-18 pairs. Oystercatchers have shown a similar trend.

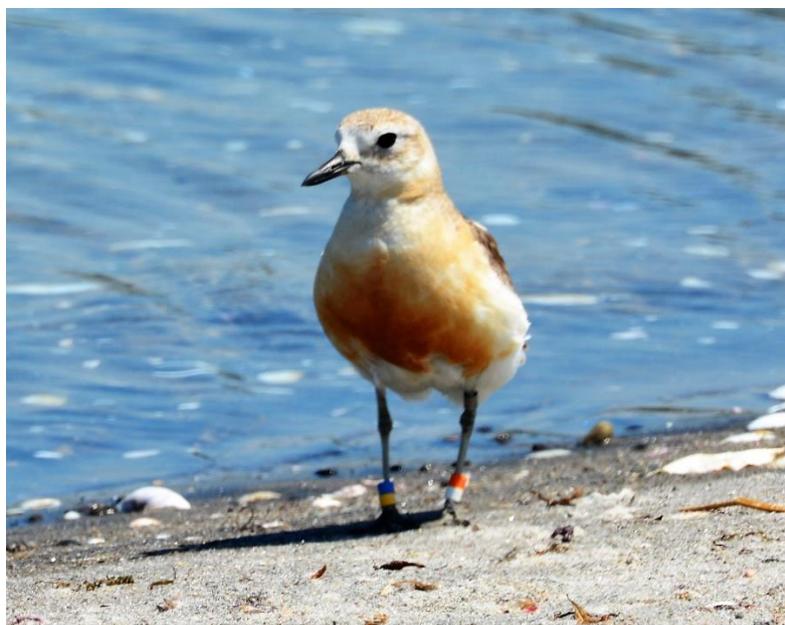


Variable oystercatcher pair with two chicks at Dotterel Point.

⁴ See Table 1 in the Appendix for English, Māori Scientific name and conservation status of birds

The average number of NZ dotterel and variable oystercatcher and associated standard deviation (SD) as determined from fortnightly counts collected during the breeding season at Maketu Spit and Dotterel Point, Pukehina.

	Year	Number of counts	<u>NZ Dotterel</u>		<u>Variable Oystercatcher</u>	
			Average	SD	Average	SD
Maketu Spit	2009	13	11	8.0	19	7.6
	2010	11	19	7.7	30	7.8
	2011	17	15	7.4	23	8.9
	2012	15	19	7.1	30	13.1
	2013	11	27	6.4	31	8.5
	2014	17	22	8.2	26	9.2
	2015	10	26	8.1	44	6.9
	2016	10	26	4.	42	6.2
	2017	7	28	9.4	49	4.0
	2018	11	30	12.6	41	10.5
	2019	8	28	12.9	26	7.4
	2020	10	29	8.5	39	10.1
Dotterel Point	2012	12	12	3.1	13	4.3
	2013	10	15	3.2	16	5.6
	2014	12	16	4.5	21	3.2
	2015	12	20	6.4	28	3.8
	2016	9	18	3.5	26	3.1
	2017	9	21	3.7	27	4.8
	2018	6	20	3.1	30	3.3
	2019	7	18	4.9	28	5.8
	2020	7	23	2.5	35	6.8



One of several NZ dotterels that were coloured banded during the Rena wreckage, and which we regularly observe at Dotterel Point, Pukehina.

Gulls and terns

The black-billed gull is the most threatened gull species in the world and is only found in New Zealand. Less than 2% of the black-billed gull population breeds on the North Island (most are on the South Island), so we are extremely lucky to have these birds on the Spit. The most distinguishable difference from our common and well-known red-billed gull is that black-billed gulls have longer and thinner bills that are black in colour, black legs and are more regal in posture and whiter in colour. Red-billed gulls have red bills that are shorter and blunter, are slightly larger but often appear smaller due to the whiter contrast of the black-billed gull.



Black-billed gull (left) compared to nesting red-billed gull (right).

Photo credit: Jack Preston (www.cinemaliawildlifeproductions.com)

According to Jim Mills who has done decades of research on red-billed gulls in NZ, Maketu Spit is only one of two breeding colonies in the country that has an increasing population. We suspect that is because the Spit is predator free, and this past year we had a record number of nesting gulls!

Due to the large colony, ground counts are often under-estimated especially because it is difficult to see all the nests in the thick vegetation. In 2020, we commissioned local photographer Andy Belcher to take four sets of drone photos to allow us to better count the nests. Using ArcGIS, we were able to classify nesting birds based on posture and shadow. The average number of red-billed gull nests was 2548, which was much greater than the ground-based counts indicating that gull numbers have likely been under-estimated for several years.

Number of red-billed gull nests identified from drone imagery in 2020

Date	Nests
14 Sept 2020	1983
2 Oct 2020	2765
21 Oct 2020	2790
4 Nov 2020	2652
Average \pm SD	2548 \pm 330



Top: Drone image supplied by Andy Belcher (<https://www.andybelcher.com/>) of the nest.
Bottom: Counts of nests (red dot) and non-nesting birds (green dot) using GIS.

Ground-based counts saw only 13 black-billed gull nests in 2020, which was lower than 2019. The maximum number of individuals counted was 45 but averaged 17 over the entire breeding season. It appears that as the red-billed gull colony expands, black-bills are getting pushed further onto the beach and away from the protection of vegetation. In previous years, black-billed nested in a small cluster on the harbourside, but in 2020 these birds were absent and were instead based on the beach near the mouth of the harbour and in a small cluster on the oceanside of the colony.

Based on ground-based counts, populations of red-billed gulls are at an all-time high while black-billed gull numbers decreased. Around 250 white-fronted terns were counted in early October, but for the second year in a row they did not nest. Whether this is because of the now large number of gulls or a carryover effect of all their nests getting washed out in 2018 is unknown.

The average number of adult red-billed gulls, black-billed gulls and white-fronted terns and associated standard deviation (SD) observed at Maketu Spit during the breeding season of each year.

Year	Number of counts	Red-billed gull		Black-billed gull		White-fronted tern	
		Average	SD	Average	SD	Average	SD
2009	13	269	131.0	0		29	9.2
2010	11	614	66.5	11	2.9	180	53.3
2011	17	75	8.6	5	1.3	18	5.1
2012	15	220	92.6	42	14.5	19	7.5
2013	11	833	250.0	30	15.0	74	80.3
2014	17	407	353.2	27	16.8	57	64.9
2015	10	1457	232.1	52	11.7	117	99.6
2016	10	957	105.0	25	22.2	65	109.8
2017	7	1667	745.4	41	20.0	131	140.6
2018	11	1334	557.9	8	12.5	104	42.4
2019	8	1752	689.6	47	16.9	33	20.6
2020	10	2436	1204.8	17	15.9	50	88.0



The view of gulls and oystercatchers from the beach at the end of Maketu Spit.

Other birds

To gain a better understanding of the number of estuarine birds that use Maketū and Little Waihi Estuaries, we compiled data submitted by local and professional birders from eBird (<https://ebird.org>). Some records dated back to 1955! This is a plethora of information and contains 346 records up to August 2021 for both estuaries, submitted by 73 different individuals.

With this information, we can look at trends in the number of birds and species observed. Going forward, we will be collecting our own data and can use this as a basis for comparisons. Since 1955, 95 species have been reported in Maketu Estuary. This includes some rare and vagrant birds such as Far eastern curlew, Hudsonian godwit, whimbrel, sharp-tailed sandpiper, pectoral sandpiper, black-fronted dotterel, black-fronted tern, white-winged tern, Australian ibis, and brown and chestnut teal. Below we have summarised results for Maketu Estuary. One exciting find this year was a far-eastern curlew that had not previously been reported via eBird although local birder Tim Barnard indicated that the species had been seen around 20 years ago.

Until recently, all our bird monitoring has focused on the breeding areas at Maketu Spit and Dotterel Point, but this past year we began surveying birds at Waihi Wetland and in the 2021 breeding season (Sept-Dec) we will be conducting five-minute bird counts and call playback surveys at Waihi wetland and Te Huauri o te kawa. This will give us a much better understanding of our wetland birds, particularly Australasian bittern, banded rail, marsh crake and spotless crake.

In January, Jenn conducted the first round of surveys at Waihi Wetland. This was nearing the end of the breeding season but served to set up locations and prepare for the Bay Conservation Cadetship teaching programme. Since then, BCA cadets have returned to the wetland in February and June to re-measure the survey sites.

One banded rail and three bitterns were detected in the January survey while numerous fernbird and 1-2 spotless crake were detected during each visit. In fact, we received a playback response of spotless crake in mid-winter during mid-day! Going forward, we will be using breeding season data to determine relative abundance of these and other wetland bird species.



Far-eastern curlew spotted in March at Te Pa Ika. Photo credit: Nathan Wakely

Maximum number of species reported in Maketu Estuary through eBird by members of the public during July 2020-June 2021, including historic high counts and associated years. Table excludes 20 species of passerines, 9 species of parrots, upland fowl and pigeon, 8 species of seabirds often reported from the mouth of the estuary and 2 domestic waterfowl.

Species	Max count	Historic high (year)
<u>Waterfowl</u>		
Australasian shoveler	40	100 (2007)
Black swan	125	500 (2019)
Brown teal	1	1 (2021)
Canada goose	200	400 (2015, 2017)
Chestnut teal	1	1 (2021)
Grey duck	2	20 (2018)
Grey teal	400	400 (2020, 2021)
Mallard	38	200 (2016)
Mallard x grey duck hybrids	60	100 (2018)
Paradise shelduck	18	56 (2016)
<u>Grebes</u>		
Dabchick	2	3 (2020)
<u>Rails</u>		
Pūkeko	49	49 (2021)
<u>Stilts</u>		
Pied stilt	300	350 (2020)
<u>Oystercatchers</u>		
SI Pied oystercatcher	403	403 (2020)
Variable oystercatcher	113	113 (2020)
<u>Plovers</u>		
Banded dotterel	72	121 (2015)
NZ dotterel	43	88 (2016)
Pacific golden plover	46	47 (2020)
Spur-winged plover	120	150 (2016)
Wrybill	17	17 (2021)
<u>Sandpipers</u>		
Bar-tailed godwit	450	850 (2018)
Far-eastern curlew	2	not previously reported
Grey-tailed tattler	0	1 (2016)
Marsh sandpiper	0	4 (1970)
Pectoral sandpiper	0	1 (1970)
Red knot	92	95 (2017)
Ruddy turnstone	4	13 (1970)
Sharp-tailed sandpiper	4	4 (2020, 2021)
Whimbrel	1	2 (2015-2017)
<u>Gulls and terns</u>		
Black-backed gull	90	200 (2017)
Black-billed gull	16	50 (2015)
Black-fronted tern	0	1 (2003, 2015, 2019)
Caspian tern	12	12 (2021)

Table continued

Species	Max count	Historic high (year)
Common tern	1	1 (2020)
Little tern	0	8 (2005)
Red-billed gull	800	800 (2020, 2021)
White-fronted tern	490	600 (2015)
White-winged tern	0	1 (2003, 2015, 2016)
<u>Penguins</u>		
Little penguin	1	1 (2015, 2020, 2021)
<u>Shags</u>		
Black shag	21	24 (2020)
Little black shag	3	25 (2015)
Little pied shag	7	35 (2015)
Pied shag	35	55 (2012)
<u>Herons, egrets, bitterns</u>		
Cattle egret	0	14 (1999)
Kotuku	1	1 (2003, 2015, 2017, 2018, 2020)
Reef heron	1	1 (2015-2019, 2021)
White-faced heron	45	50 (2017)
<u>Ibises and spoonbills</u>		
Australian ibis	0	1 (1977)
Royal spoonbill	68	75 (2017)
<u>Raptors</u>		
Harrier hawk	3	5 (2018)
<u>Kingfishers</u>		
Kotare	18	30 (2018)
<u>Passerines</u>		
Fernbird	5	5 (2020)



Royal spoonbills at Waihi Wetland, but commonly observed in Maketu Estuary as well.

Photo credit: Jack Preston (www.cinemaliawildlifeproductions.com)

Reptiles

MOWS has monitored shore skink (*Oligosoma smithi*; at risk - naturally uncommon) since November 2013 when a set of 60 pitfall traps were set around the perimeter of Maketu Spit. Following the establishment of the BMPs in 2014 a permit was sought and obtained (39592-FAU) to permit the catch, handling and release of shore skinks at these sites.

In 2015, the orientation of traps at Maketu Spit was switched to three grids comprising nine traps, spaced 5 m apart (i.e., a 3 x 3 grid). Concurrently, grids were also placed in the foredune and backdune at Newdick's Beach and Dotterel Point, Pukehina. Pitfall traps are 5 L pails baited with banana or pear, and include a handful of vegetation, a wetted sponge and most recently a bottle cap full of water. Trapping occurs in Spring (pre-breeding; late November or early December) and again in Autumn (post-breeding; February but as late as April). The trapping event is 4 days and 3 trap nights.

Since 2016, 531 shore skinks have been captured across the three sites (Maketu = 256 , Newdick's = 57 , Dotterel Point = 218) including 34 recaptures. Once captured, skinks are weighted, measured, marked with a temporary non-toxic marker and released. Only a preliminary analysis has been conducted to calculate catch per unit effort (CPUE). Site-specific mean catch per unit effort (\overline{CPUE}) was calculated as:

$$\left(\sum \frac{\text{number captured}_i - \text{number recaptured}_i}{\text{number of traps}_i} \times 100 \right) / n$$

Associated standard error (se) was calculated as: $sd(\overline{CPUE}) / \sqrt{n}$. Where i = a single trapping event , n = the number of trap events during each season which always equalled 3, and sd = standard deviation.

Preliminary results suggest that both spring and autumn catch records have decreased at both the east and west grid at Pukehina and at the east grid of Newdick's Beach in the past 5 years. CPUE at Maketu Spit has fluctuated while the west grid at Newdick's Beach has always remained low. To eliminate the likelihood of potential trap shyness which could account for decreasing trap records, we shifted each trap grid approximately 50 m away from its original location in 2020.

Although we vaguely understand which populations are increasing or decreasing, we have little or no understanding of the management techniques we can implement to further increase populations. Possibly, decreasing skink numbers could result from increases in predators, toxic baits that are used to control predators, habitat quality or other environmental factors that we have yet to measure. Going forward, skink numbers will be compared to trap data and bait take and a habitat analysis study is in the works.



Laura Rae recording data while the subject in question looks on

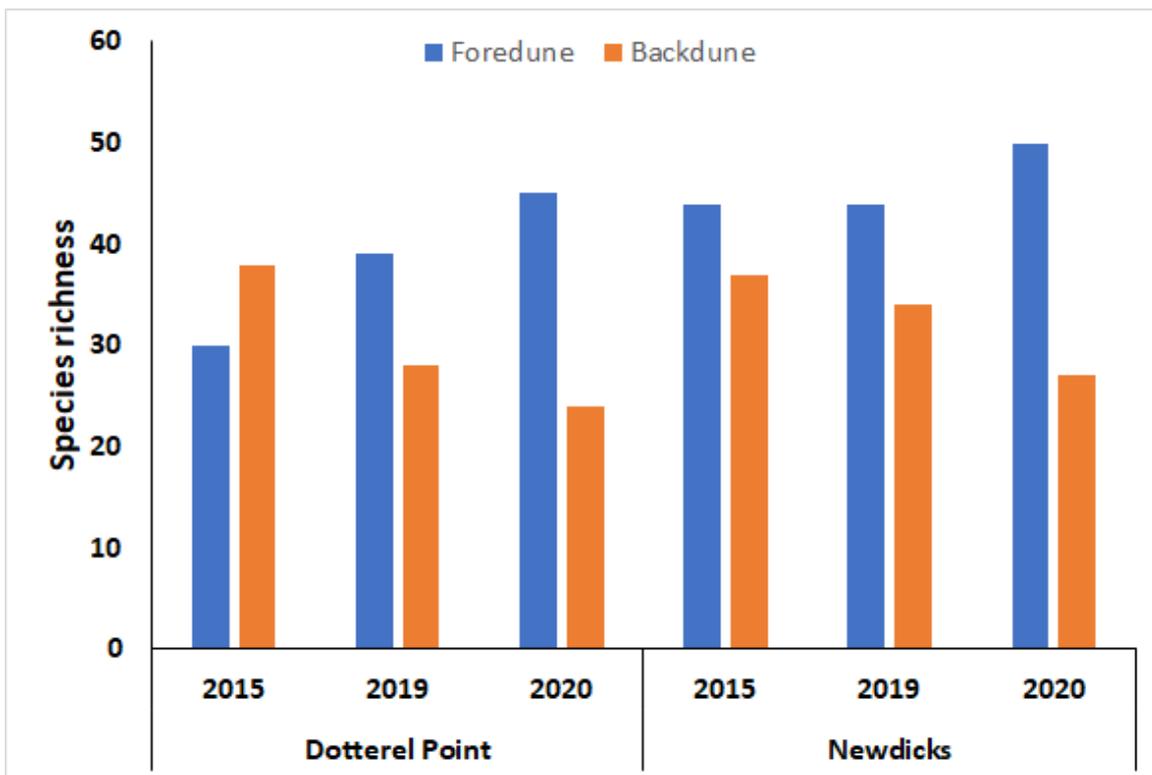
Invertebrates

Similar to skinks, terrestrial invertebrates are sampled twice yearly (Spring and late summer) using pitfall traps. These traps are 500 mL and are set in two transects of 15 traps spaced 10 m apart (30 traps total). Transects are positioned in different microhabitats (often foredune and backdune). Traps are left for 14 days then retrieved, during which time invertebrates are preserved in propylene glycol and then identified to a representative taxonomic unit or RTU, such that although we have no idea what species of ants we may have, we know that Ant1 and Ant2 are different based on physical characteristics (size, color, shape, antenna, hairs, etc).

Due to personnel changes, we had a large backlog of invertebrates to sample. Luckily, Jenn is also involved with the Bay Conservation Cadetship and has been able to collaborate with BCA and have cadets sort and identify invertebrates collected at Waihi Wetland in 2020/2021 as part of their training. Following completion of intake 1, MOWS contracted two cadets to sort through the remaining samples collected from Newdick's Beach and Dotterel Point in 2019/2020.

Species richness (number of different species at a site) was measured at Dotterel Point and Newdick's Beach in 2015 and again in 2019/2020. At Dotterel Point in 2015, over 2639 individuals were counted in April and December, while in 2019/2020 1093 individuals were counted. At Newdick's Beach, 1836 were counted in 2015 and 797 were counted in 2019/2020.

Slaters were the most abundant species in the foredune at Dotterel Point in 2015 and Newdick's Beach in February 2020. At Dotterel Point, ants were the most abundant species in the mid- and backdune in 2015 and snails were most common in the backdune in February 2020. Otherwise, mites tended to be the most common invertebrates in both the foredune and backdune of both sites.



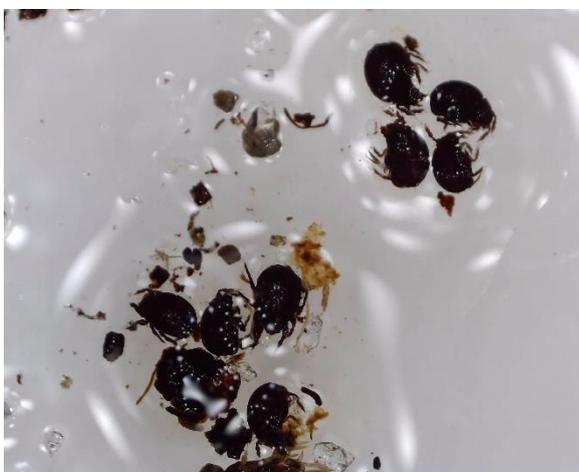
Species richness of the foredune (blue) and backdune (red) at Dotterel Point, Pukehina (left) and Newdick's Beach (right), in 2015 (both seasons combined), compared to Dec 2019 and February 2020.

At Waihi Wetland, 30 traps were set out along the Pongakawa and Wharere Canals. In December, the abundance of invertebrates was very high and 2977 individuals were counted. Crickets tended to be very common and 269 were counted in a single trap! In February, things were much quieter and only 774 individuals were captured in the traps, with ants being the most common. It is not surprising to see that after four years of restoration, terrestrial invertebrate richness is 3-7 times greater than it was in 2016-2017.

Species richness and the number of terrestrial invertebrates collected and identified to a representative taxonomic unit at Waihi Wetland west block in 2016/2017 and 2020/2021.

Year	Species richness	Number of individuals
Dec-16	13	150
Apr-17	19	559
Dec-20	92	2977
Feb-21	56	774

Trapping at Maketu Spit is scheduled for 2021/2022 and with the assistance of the BCA cadets we will be able to quickly sort and identify samples, which will give us more time to properly analyse the data we have collected to date. An investment in a digital and stereo microscope has been a tremendous help in this.



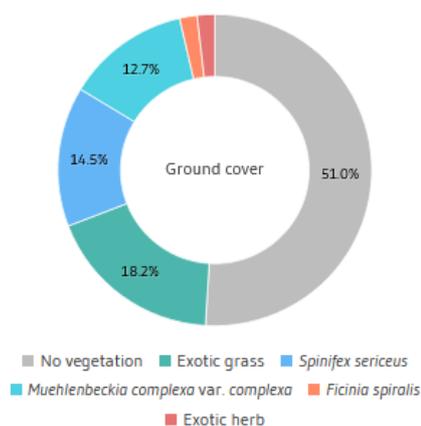
Pseudoscorpion (top left), millipedes (top right), mites (bottom left) and two different ant species (bottom left), collected from invertebrate pitfall traps.

Vegetation⁵

Vegetation transects are measured every two years throughout all our focal sites. Measurements are taken in February/March. This past year, in conjunction with our 5 x 50 m RECCE plots, we also measured transects using the rapid point count method that was developed by the Coastal Restoration Trust. By entering data on their website, we can easily compare and monitor the changes in our dune vegetation and dune profiles.

In May 2017, Coastal Restoration Trust established 6 transects on Maketu Spit and 3 on Newdick's Beach. Unfortunately, because our measurements were taken in February they are not truly comparable so this upcoming May we will re-measure these transects to compare them to the 2017 measurements.

13/08/2020 ◀ Transect 2 ◀ Spit Site 1 - Schools



Ground cover

By species

- *Exotic grass* 18.2%
- *Spinifex sericeus* 14.5%
- *Muehlenbeckia complexa var. complexa* 12.7%
- *Ficinia spiralis* 1.8%
- Exotic herb 1.8%

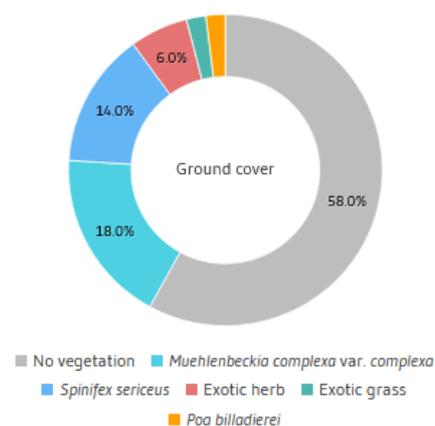
Native species

59.2% of samples with vegetation cover

No vegetation

50.9% of total samples

26/02/2021 ◀ Transect 2 ◀ Spit Site 1 - Schools



Ground cover

By species

- *Muehlenbeckia complexa var. complexa* 18.0%
- *Spinifex sericeus* 14.0%
- Exotic herb 6.0%
- Exotic grass 2.0%
- *Poa billadierei* 2.0%

Native species

81.0% of samples with vegetation cover

No vegetation

58.0% of total samples

Results from rapid point count surveys at Maketu Spit collected by Te Puke High School students as part of the education program. Results are generated from the Coastal Restoration Monitoring database. Going forward, we will compare our biodiversity data in a similar manner to map changes in dune vegetation and dune profiles.

⁵ See Table 2 in the Appendix for English, Māori Scientific name and conservation status of plants

Education programme

Maketu Ongatoro Wetlands Society (MOWS) Education Programme has seen great success over 2020-21. The five core schools (Maketu Kura, Paengaroa Primary, Te Puke Primary, Te Puke Intermediate, Te Puke High School (TPHS)) have continued to participate in the education programme. We have also launched the programme with Rangiuuru School thanks to an increase in Long Term Plan funding from Western Bay of Plenty District Council. Other local schools (Pukehina, Fairhaven, Whakamarama, Otamarakau and Pongakawa) have also had the opportunity to be involved in a few programmes thanks to funding from BayTrust and TECT. The MOWS team has seen some changes this year with a few new members to replace those who have left or are in the process of moving on.

The MOWS education programme is continuing to grow with Rangiuuru School coming on board from Term 3 and the development of a larger Te Puke High School programme. The schools are keener than ever to receive environmental and conservation education.

MOWS is in the process of expanding the programme to include 8 modules over two years that encapsulates the various ecosystems of the whole catchment from the ngahere to the moana. This will ensure that schools have plenty of options to choose from and to build on the students' knowledge over consecutive years. We are exploring how we can integrate mātauranga maori with science concepts and would like to bring in expertise in specific areas from our local community.

We are very grateful for the funding from Western Bay of Plenty District Council, TECT and BayTrust to run our programme successfully and we look forward to supporting our schools with their nature education programmes long into the future.



Maketu Ongatoro Wetland Society education officers ready for dune surveying with TPHS. From left: Anna Wentsch (back), Grace Griffin (front), Tania Bramley, Jenn Sheppard, Awhina Awhimate, Maureen Binns, Nathan Wakely, Raven Nicholas and Laura Rae.

Term Four 2020

MOWS ended 2020 by celebrating the return of migrating bar-tailed godwits to Maketu Estuary. In class students learnt about the different adaptations of shorebirds, waders and forest birds. The MOWS taxidermy collection makes for hands-on learning experience, giving students an opportunity to closely see birds.

Field trips took students to Maketu Estuary joining Elaine Tapsell from Maketu Taiapure Trust to study kaimoana/shellfish beds. This is an ongoing study conducted annually in November to assess the size and distribution of pipi (*Paphies australis*) and tuangi/cockles (*Austrovenus stutchbury*). Students use a quadrat placed every 5m along a 30m transect line and record and measure every living organism on the surface down to 10 cm depth. This data is vital to assessing the changes in shellfish abundance and distribution following the re-diversion works on the Kaituna River. Following sampling, students explored the rocky shore ecology of Okurei Point. Each field trip concluded with a BBQ lunch and prize giving to acknowledge distinguished students. There was a great turn out of parents in the final trips this year.

Te Puke Intermediate Edventure unit requested assistance with a unit about caring for their local area. MOWS hosted a wetland day at Waihi Wetland, teaching students about how land use impacts the estuary, and the important functions wetlands have for filtering the water and providing habitats for native birds, invertebrates and fish species. It was great to work alongside many former students from Maketu Kura.



Clockwise from top: Janie Stevenson teaching students about marine biosecurity risks, Paengaroa School students identifying rocky shore creatures, Lily and Tawhai measuring pipi, TPI students completing a Marine Meters Squared survey on the rocky shore.

Term one 2021

Numerous schools participated in several units this term. Students from Te Puke High School (TPHS) Year 12 Earth Science class and Te Puke Primary Unstoppables learned the importance of freshwater ecosystems and assessed water quality. This was a continuation from previous years where students from TPHS surveyed five sites along the Kaikokopu stream from Redwood Valley Farm, Paengaroa, down to its outflow in Waihi

Estuary. During the activity, students measure temperature, water clarity, nitrate, phosphate and E. coli, and record freshwater invertebrates to assess biological indicators of water quality. TPHS students compare data to previous years and write a report to gain NCEA Level 2 Science credits.

Dune ecology was the main unit with over 200 TPHS Year 11 students visiting Maketu Spit to survey dune flora and fauna. Information gathered from rapid-point count surveys of dune vegetation transects and pitfall surveys of terrestrial invertebrates was used in scientific reports required to obtain NCEA Level 1 credits. Vegetation survey data were also inputted into the Coastal Restoration Monitoring national database. This was part of a new initiative introduced into the NCEA curriculum, integrating a more practical approach to learning science. TPHS was only one of three schools throughout the country trialling the new initiative. The successful event was run in collaboration with Coast Care and Coastal Restoration Trust.

Te Kura o Maketu and Te Puke Primary Ngakau Mahaki participated in the rocky shore unit. A number of year 1-6 students from both schools investigated the flora and fauna that inhabit the rocky shore learning about zonation, biosecurity and anthropogenic influences on these environments. Students also collected rubbish, further reiterating the importance of our kaitiakitanga roles in protecting these environments.

Te Puke Intermediate participated in a baseline stream assessment of the Ohineangaanga stream at Donovan Park, Te Puke. The unit focused on aquatic macroinvertebrates whereby students collected samples from the stream to identify them and assessed water clarity. The school intends to collect this information in future years to measure how the aquatic fauna responds to planned restoration.

Paengaroa Primary, Te Puke Primary, and Te Puke Intermediate participated in underwater fish surveys and snorkelling; an activity that is funded by TECT and run by Marine Biologist Emma Richardson (Discovery Through Nature). Teaching students about water safety and building their confidence in the water environment while learning how to snorkel and conduct a marine fish survey was a great success, despite the cooling weather conditions.

Te Puke Intermediate Edventure focussed on the ngahere and Bay Conservation Alliance educator, Emma Cronin joined Janie Stevenson in the classroom to discuss mammalian predators. Students were given an opportunity to touch taxidermied pests and learn about the various traps that conservation groups use.



Students from Te Puke Intermediate identifying macroinvertebrates (left) and assessing water clarity (right).



TPHS year 11 students observing freshwater invertebrates collected from Redwood Valley Kaikokopu stream (left) and water quality collected from Little Waihi outflow (right).



Te Puke primary Ngakau Mahaki students exploring the rock pools around Okurei Point, Maketu (left & top right photo). Maketu Kura found an anemone during their excursion to the rocky pools (bottom left photo).

Term Two

In term 2, Janie Stevenson replaced Tania Bramley as the education office. Although she was now living in central north island, Tania continued to run the dunes programme alongside the team.

This unit is of great significance as coastal dune environments are one of the most degraded natural ecosystems in New Zealand, yet many depend upon dunes to protect and buffer the land from storm events that are forecasted to become more frequent and forceful. Several schools were involved including Te Puke Primary Ngakau Mahaki, Te Puke Intermediate ECO, Pukehina Primary, Paengaroa Primary, Te Kura o Maketu and TPHS Year 13 Earth Science. Students learned about the importance of dune ecosystems and enthusiastically participated with restoration work replanting dunes in the Pukehina and Newdicks beach areas. Zones that had been replanted in previous years by students were revisited to showcase successful replanting and associated dune accretion. TPHS and Paengaroa Primary also removed over two tonnes of weeds. Over 1500 native pingao, spinifex and wiwi were planted across the five sites by all six schools. A big thank you to Chris Ward and Jayne from Coast Care Bay of Plenty for running this unit collaboratively.

Thirty students from Fairhaven Primary visited the Te Huari o Te Kawa Wetland site to discuss the importance of pest control management. Students identified prints from tracking cards, learned about DOC200 traps and the different types of baits used when targeting specific pests, and were educated about wetland development, inanga spawning grounds and floating wetlands. They ended the day by retrieving a hīnaki to find a short-finned eel (*Anguilla australis*) and several common bullies, *Gobiomorphus cotidianus*.

Te Puke Intermediate Edventure enjoyed a rainy day field trip in the ngahere at Otanewainuku with Bay Conservation Alliance, learning about the taonga species that live there, bird monitoring and the special trees at that site.

Janie and Laura hosted Whakamarama School for a wetland planting day at Tumu Kawa wetland. The school had heard about the MOWS programme through their Wild about NZ educator. They made a donation to MOWS for the experience and brought their own bus. Janie and Laura ran three activities and students planted 250 plants, including miro, kahikatea, harakeke and ti kouka.

TPHS Year 12 earth science class also visited Tumu Kawa. As part of their NCEA Assessment standard, the class will undertake an action that contributes towards a sustainable future by restoring an area of the wetland by planting. The planting took place in term 3, but the purpose of the visit in term 2 was to view and map the site to determine how many plants of each species are required to plant their given areas.



Chris Ward from Coast Care BOP talking to students from Te Kura o Maketu about dune ecology (left). Students planting pingao at Newdicks beach (right).

Term Three

Wetlands was the only unit offered in term 3. The education team visited six schools and presented about the importance of wetland habitat and delivered a rotation of exciting, interactive activities on the various native plant, fish and bird species that live in our wetlands.

Schools then visited Tumu kawa wetland to experience a full day of planting and learning about the birds, water quality, plants and macroinvertebrates. Special activities and korero on the kahikatea were delivered by Liam Tapsell from Ngati Whakaue. DOC staff Nataalia Lunson, Raponi Wilson and Karl McCarty supported the programme by delivering an activity on matuku hurepo. BOPRC supported the programme and Land Management Officer, Michael Tyler, was on-site to support the planting activity. Due to the COVID-19 lockdown, trips were postponed and Otamarakau School and Maketu kura were unable to attend.

Overall, 250 students planted 1700 plants over 1 acre of the newly restored wetland site.



Dante Mason and Grace Gibney from Te Puke Primary Ngakau Mahaki (left) plant a special rimu tree at Tumu kawa wetlands. Students from Whakamarama School (right) look closely at the shortfin tuna caught in the wetland. Seniors from Paengaroa plant nearly 200 wetland plants (bottom).



External contracts

Papahikahawai, Te Pa Ika - Animal Pest Control

Papahikahawai Island is a 17 ha island situated in Maketu Estuary it is an old backdune and until recently was connected to the Spit by two causeways. These were removed as part of the Kaituna Rediversion project and it is now connected to Makeut Spit via a bridge that was constructed in 2017. Te Pa Ika is a 24 ha wetland area at the end of Maketu Estuary along Ford Road, it was previously reclaimed farmland of very limited value and was turned back into wetland and shorebird habitat as part of the Kaituna Rediversion Project. For the second year in a row, MOWS has been delivering animal pest control to both areas, but unfortunately we were unsuccessful in our bid for pest plant control at Papahikahawai.

Pukehina Esplanade Reserve - Restoration

This is a 1200 m stopbank that runs around the eastern end of Waihi estuary and kinks with the Waihi estuary wetland where we have an EP in operation. It is a Western BOP District Council reserve and had become heavily overgrown with gorse, pampas, wattles, boneseed as well as having some large mature pines and some small to medium sized eucalypts. In 2020 we were asked by WBOPDC to start working on it with a very modest budget. This has allowed us in the first instance to clear the stopbank so that it is easy to access the whole length of it and we have removed some of the smaller and medium-sized trees. We are just in the process of putting together an ongoing plan to remove most of the rest of the trees and to replace them with native trees and shrubs. As we have seen elsewhere, just by removing a lot of the alien weed species, natives have started re-appearing - they really are 'the best'!

Te Arawa Lakes Trust - Mowing and Property Maintenance

This contract is in its fourth year and the number of plots involved has grown from a dozen to over 20. While it is not strictly ecological restoration work, it does enable us to do a significant amount of weed control in Maketu and Little Waihi - and provides us with some additional cash to pay wages and maintain machinery. It also allows us to develop a good relationship with TALT which is the major landowner in the area.

Other contracts

For the 2021-2022 financial year, we obtained a skink salvage contract to relocate shore skink from the Kaituna Mole, and an Animal Pest Control contract for Ford Island. We also did a couple of small contracts for private properties in Pukehina - mainly controlling weeds in the dunes and replanting.



Jenn relocates native shore skink from the Kaituna Mole further along Maketu Spit.

Volunteer days and hours

Like most of the world, COVID-19 disrupted our volunteer days and community events, but over the past financial year, we still managed to host a few events when weather was favourable.

Despite a cold and wet November morning, MOWS teamed up with Predator Free Maketu, sharing a tent together at the Maketu Market. Janie, who ran Predator Free at the time, had people sign up to help work towards eradicating rats in Maketu and the wider community, getting a choice of a variety of traps to take home. Carolyn (MOWS) shared the many taxidermy pests she had caught in Maketu, demonstrating her methods used to control numbers. It was great to see the interest and determination people had in restoring and protecting the mauri of our coastal areas and wetlands.

In April, MOWS hosted a rubbish clean up at Maketu Spit. The following month, nearly 15,000 plants were planted during a working bee at the end of Cutwater Road on 23 May, a collaborative planting day with WaiKokopu, DOC, BOPRC and the Pukehina community. The plants will protect and enhance an area of newly restored inanga spawning habitat. Despite poor weather on 27 June, MOWS, Coast Care and 7 volunteers planted 288 pingao and spinifex at Newdick's Beach.



The MOWS and Predator Free tent at the Maketu markets (left). Jayda Bramley, Carolyn Symmans and Janie Stevenson promoting MOWS and Predator Free Maketu at the markets (right).



Volunteers planting the wetlands along Maketu Spit (left). Breanna Rae planting the dunes in the rain at a working bee (right).

Our team



Julian Fitter
Chair



Jenn Sheppard*
Operations manager



Team leader – Laura Rae*
Biosecurity and restoration



Awhina Awhimate
Biodiversity officer



Raven Nichols
Biosecurity and restoration ranger



Janie Stevenson
Education officer and secretary



Carolyn Symmans
Pest control officer



Peter Ellery*
Wetland restoration ecologist



Maureen Binns*
Educator



Claire Hartley*
Webmaster



Tania Bramley
Former education team leader



Grace Griffin
Education officer



Rueben Aikman
Volunteer bird monitor



Tiffany Randell
Volunteer bird monitor



Shane Gregory
Pest control contractor



Peter Jackson*
Contractor



Gary Williams
Accountant

* Committee member

Acknowledgements and supporters

We would like to acknowledge the hard work and dedication of our committee, our biosecurity and restoration team, our monitoring team, educators, and numerous volunteers. We would like to extend a huge thank you for the 400 school kids that we've had the privilege to teach this year and their associated teachers and schools.

We collaborate with several organisations and would like to express our gratitude to: Chris Ward (Coast Care), Rusty Knuston, Richard Lyons, Michael Tyler, Pim de Monchy and Steph Bathgate (BOPRC), Glenn Ayo, Peter Watson and Sue Hammond (WBOPDC), Karl McCarthy and Emma Woods (DOC), Michelle Elborn, Wayne O'Keefe, Remedy Emtage and Emma Richardson (all BCA).

We would also like to take a moment to acknowledge Tania Bramley. Tania has recently moved to the central North Island, but during her 10 years with MOWS, she started and ran the Newdicks Beach project developed our successful education programme from scratch.

Our hard work would not be possible without the support of our funders and sponsors.



Financials

Notes to the Performance Report

Maketu Ongatoro Wetland Society For the year ended 30 June 2021

	2021	2020
1. Analysis of Revenue		
Donations, fundraising and other similar revenue	10,200.00	8,250.00
Fees, subscriptions and other revenue from members	139.16	941.34
Revenue from providing goods or services		
BOP Regional Council - BMP's	100,882.77	81,380.00
BOP Regional Council - Other Contracts	25,594.88	29,856.12
Western BOP District Council	40,120.32	52,177.08
Te Arawa Lakes Board Trust	6,281.38	9,259.09
Bay Trust	-	15,000.00
TECT	65,000.00	48,220.86
Other Contracts	22,522.04	3,884.60
Total Revenue from providing goods or services	260,401.39	239,777.75
Interest, dividends and other investment revenue	18.88	78.25
Total Analysis of Revenue	270,759.43	249,047.34
	2021	2020

2. Analysis of Expenses

Costs related to providing goods or services		
Administration	85,574.41	67,478.13
Contract Expenditure	211,251.54	118,315.25
Total Costs related to providing goods or services	296,825.95	185,793.38
Total Analysis of Expenses	296,825.95	185,793.38
	2021	2020

3. Analysis of Assets

Bank accounts and cash		
00-CUR Maketu Ongatoro Wetland	39.27	92.40
01-SAV Maketu Ongatoro Wetland	42,851.66	52,940.68
Total Bank accounts and cash	42,890.93	53,033.08
Debtors and prepayments		
Accounts Receivable	11,730.52	31,503.44
Total Debtors and prepayments	11,730.52	31,503.44
Property, Plant and Equipment		
Plant & Equipment	65,688.76	61,344.92
Buildings	84,984.07	84,984.07
Total Property, Plant and Equipment	150,672.83	146,328.99
Total Analysis of Assets	205,294.28	230,865.51

2021 2020

Property, Plant and Equipment

2021 2020

4. Analysis of Liabilities

Creditors and accrued expenses

Accounts Payable	6,539.39	14,334.63
GST	7,093.08	911.37
Withholding Tax Payable	950.17	962.40
Total Creditors and accrued expenses	15,382.64	16,208.40

Other current liabilities 0.03 -

Total Analysis of Liabilities 15,382.67 16,208.40

2021 2020

5. Accumulated Funds

Accumulated Funds

Opening Balance	214,657.11	151,403.15
Accumulated surpluses or (deficits)	(26,066.52)	63,253.96
Total Accumulated Funds	188,590.59	214,657.11

Total Accumulated Funds 188,590.59 214,657.11

6. Events After the Balance Date

There were no events that have occurred after the balance date that would have a material impact on the Performance Report (Last year - nil).

7. Related Parties

Julian Fitter is the Chairperson of the entity and also provides management and operational services. During the year, the committee authorised payment of \$29,769 excluding GST (2020: \$23,711) for provision of those management and operational services.

8. Impact of the Economic Environment Post Covid-19

The entity has maintained its financial strength post Covid-19 and is well positioned to continue its operations for the foreseeable period ahead.

Appendix - Bird and plant names

English, scientific and Māori name and associated conservation status of all bird species mentioned throughout this report.

English name	Scientific name	Māori name	Conservation Status
Australasian bittern	<i>Botaurus poiciloptilus</i>	Matuku hūrepo	Nationally critical
Australian ibis	<i>Threskiornis molucca</i>		Vagrant – least concern
Australasian shoveler	<i>Anas rhynchos</i>	Kuruwhengi	Not threatened
Banded dotterel*	<i>Charadrius bicinctus</i>	Tūturiwhatu	Nationally vulnerable
Banded rail	<i>Gallirallus philippensis</i>	Mioweka	Declining
Bar-tailed godwit	<i>Limosa lapponica</i>	Kuaka	Declining
Bellbird	<i>Anthornis melanura</i>	Korimako	Not threatened
Black-backed gull	<i>Larus dominicanus</i>	Karoro	Not threatened
Black-billed gull*	<i>Larus bulleri</i>		Nationally critical
Black-fronted dotterel	<i>Elseyornis melanops</i>		Naturally uncommon
Black-fronted tern*	<i>Chidonias albostratus</i>	Tarapirohe	Nationally endangered
Black shag	<i>Phalacrocorax carbo</i>	Kawau	Naturally uncommon
Black swan	<i>Cygnus atrats</i>	Kakīānau	Not threatened
Brown teal*	<i>Anas chlorotis</i>	Pāteke	Recovering
Canada goose	<i>Branta canadensis</i>		Introduced
Caspian tern	<i>Hydroprogne caspia</i>	Taranui	Nationally vulnerable
Cattle egret	<i>Adrea ibis</i>		Migrant – least concern
Chestnut teal	<i>Anas castanea</i>		Vagrant – least concern
Common tern	<i>Stern hirundo</i>		Vagrant – least concern
Dabchick*	<i>Poliocephalus rufopectus</i>	Weweia	Recovering
Far eastern curlew	<i>Numenius madagascariensis</i>	Vagrant – endangered	
Fernbird*	<i>Bowdleria punctata</i>	Mātātā	Declining
Grey-tailed tattler	<i>Tringa brevipes</i>		Vagrant – near threatened
Grey teal	<i>Anas gracilis</i>	Tētē	Not threatened
Harrier hawk	<i>Circus approximans</i>	Kāhu	Not threatened
Hudsonian godwit	<i>Limosa haemastica</i>		Vagrant – least concern
Kingfisher (scared)	<i>Todiramphus sanctus</i>	Kōtare*	Not threatened
Little black shag	<i>Phalacrocorax sulcirostris</i>	Kawau tūi	Naturally uncommon
Little penguin	<i>Eudyptula minor</i>	Kororā	Declining
Little pied shag	<i>P. melanoleucos</i>	Kawau paka	Not threatened
Little tern	<i>Sternula albifrons</i>		Migrant – least concern
Marsh crake	<i>Porzana pusilla</i>	Koitareke	Declining
Marsh sandpiper	<i>Tringa stagnatilis</i>		Vagrant – least concern
Mallard duck	<i>Anas platyrhynchos</i>		Introduced
NZ Dotterel*	<i>Charadrius obscurus</i>	Tūturiwhatu pukunui	Recovering
Pacific golden plover	<i>Pluvialis fulva</i>		Migrant – least concern
Paradise shelduck	<i>Tadorna variegata</i>	Pūtangitangi	Not threatened
Pectoral sandpiper	<i>Calidris melanotos</i>		Vagrant – least concern

Pied shag	<i>Phalacrocorax varius</i>	Kāruhiruhi	Recovering
Pied stilt	<i>Himantopus himantopus</i>	Poaka	Not threatened
Purple swamphen	<i>Porphyrio melanotus</i>	Pūkeko	Not threatened
Red-billed gull	<i>Larus novaehollandiae</i>	Tarāpunga	Declining
Red knot	<i>Calidris canutus</i>	Huahou	Nationally vulnerable
Red-necked stint	<i>Calidris ruficollis</i>		Migrant – near threatened
Reef heron	<i>Egretta sacra</i>	Matuku moana	Nationally endangered
Royal spoonbill	<i>Platalea regia</i>	Kōtuku ngutupapa	Naturally uncommon
Ruddy turnstone	<i>Arenaria interpres</i>		Migrant – least concern
Sharp-tailed sandpiper	<i>Calidris acuminata</i>		Migrant – Least concern
SI Pied oystercatcher*	<i>Haematopus finschi</i>	Tōrea	Declining
Spotless crake	<i>Porzana tabuensis</i>	Pūweto	Declining
Spur-winged plover	<i>Vanellus miles</i>	—	Not threatened
Variable oystercatcher*	<i>Haematopus unicolor</i>	Tōrea pango	Recovering
Whimbrel	<i>Numenius phaeopus</i>		Migrant – least concern
White-faced heron	<i>Egretta novahollandiae</i>	Matuku	Not threatened
White-fronted tern	<i>Sterna striata</i>	Tara	Declining
White heron	<i>Ardea modesta</i>	Kōtuku	Nationally critical
White-winged tern	<i>Childonias leucopterus</i>		Migrant – least concern
Wrybill*	<i>Anarhynchus frontalis</i>	Ngutuparore	Nationally vulnerable

* Endemic to New Zealand

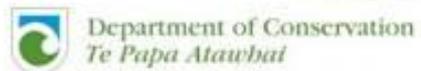


Kōtuku at Te Huauri o te kawa wetland.

English, scientific and Māori name and associated conservation status of all plant species mentioned throughout this report.

English name	Scientific name	Māori name	Conservation Status
African ice plant	<i>Carpobrotus edulis</i>		Exotic
Bolboschoenus	<i>Bolboschoenus fluviatilis</i>	Kukuraho	Not threatened
Boneseed	<i>Chrysanthemoides monilifera</i>		Exotic
Bramble	<i>Rubus fruticosus</i>		Exotic
Cabbage tree	<i>Cordyline australis</i>	Ti kouka	Not threatened
Cactus	<i>Opuntia sp.</i>		Exotic
Cape daisy	<i>Arctotheca calendula</i>		Exotic
Dimorphotheca	<i>Dimorphotheca fruticosa</i>		Exotic
Flax	<i>Phormium tenax</i>	Harakeke	Not threatened
Reed sweet grass	<i>Glyceria maxima</i>		Exotic
Gorse	<i>Ulex europaeus</i>		Exotic
Gravel groundsel	<i>Senecio skirrhodon</i>		Exotic
Inkweed	<i>Phytolacca octandra</i>		Exotic
Italian buckthorn	<i>Rhamnus alaternus</i>		Exotic
Japanese honeysuckle	<i>Lonicera japonica</i>		Exotic
White pine	<i>Dacrycarpus dacrydioides</i>	Kahikatea	Not threatened
Kikuyu	<i>Cenchrus clandestinus</i>		Exotic
Brown pine	<i>Pectinopitys ferruginea</i>	Miro	Not threatened
Montbretia	<i>Crocsmia x crocomiiflora</i>		Exotic
Moth plant	<i>Arauija hortorum</i>		Exotic
Native musk	<i>Thyridia repends</i>		At risk – naturally uncommon
Oxalis	<i>Oxalis sp.</i>		Exotic
Pampas	<i>Cortaderia selloana</i>		Exotic
Golden sand sedge	<i>Ficinia spiralis</i>	Pingao	At risk - declining
Purple groundsel	<i>Senecio elegans</i>		Exotic
Sea couch	<i>Elytrigia pycnantha</i>		Exotic
Spinifex	<i>Spinifex sericeus</i>	Kowhangatara	Not threatened
Tree lupin	<i>Lupinus arboreus</i>		Exotic
Wattle	<i>Acacia mearnsii</i>		Exotic
Wildling pine	<i>Pinus radiata</i>		Exotic
Willow	<i>Senecio elegans</i>	Exotic	
Knobby club rush	<i>Ficinia nodosa</i>	Wiwi	Not threatened
Yucca	<i>Agave americana</i>		Exotic

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**

