Phase 1 Progress Report
Oruawharo Medlands Ecovision

October 2019 – October 2022

Compiled by John Ogden on behalf of Oruawharo Medlands Ecovision

Oruawharo Medlands Ecovision's mission is to work with the local community to reduce mammalian pests and invasive weeds in the Medlands/Oruawharo Bay area, including the dunes and wetland, with the aim of improving the habitats of indigenous species.

To volunteer or for further information about the Oruawharo Medlands Ecovision group, please email Lotte McIntyre, OME Co-ordinator at medlandsecovision@gmail.com or phone 029 770 5111.

Oruawharo Medlands Ecovision Group
Progress Report for phase 1
October 2019 - October 2022

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EXECUTIVE SUMMARY

- This report covers the period from the formation of the Oruawharo/Medlands Ecovision Group (OME) in 2019 to September 2022.
- Within the current OME area there are three main semi-natural ecosystems (beach, dunes and wetland) and a settlement of c. 130 houses. The two rocky off-beach islets are included within 'dunes' for comparative purposes.
- The 0ME group comprises a committee of c.12 individuals, plus other volunteers and associates.
- Meetings are held at approximately monthly intervals. Field days for planting and weeding in the wetland are weekly. Other meetings involving speakers and public participation are held periodically during the summer months when Medlands householders are present.
- The group has been supported by funding and in other ways by the Aotea Great Barrier Island Local Board (ALB). Grants totalling > $67,500 from ALB and $70,800 from the Department of Conservation have enabled the employment of a programme coordinator and fieldworker, and covered other costs.
- Projects on the beach have been around protecting and monitoring the nesting New Zealand dotterels and Variable Oystercatchers. Beachgoers have been made more aware of this and new signage has been erected.
- Since 2019 dotterels have increased and oystercatchers maintained their numbers despite an increase in people on the beach. Both species averaged 5 nesting pairs and c. 0.8 fledged young per pair per year. With the existing protective measures, this appears adequate to maintain their populations.
- The trapping of rats and mice overall has removed nearly 4000 rodents of which c. 50% were mice. Tracking tunnel indices <10, and catch per 100 Trap Nights <5 indicate a relatively low rodent population overall.
- Catch per 100 trap nights and tracking tunnel indices were correlated, giving confidence in the results.
- Rodents are abundant under the pohuehue cover of the southern dunes compared to the spinifex area at the north.
- Mice may be more significant than rats in reducing the insect and lizard populations. Where mouse numbers are low (e.g. on the off-beach islets) insects and lizards appear to be more abundant.
- The inhabited area ("the village") comprises (mainly) holiday houses and gardens. The gardens provide a diverse habitat for many bird species including banded rail, tui, piwakawaka, kotare, tauhou, riroriro, kākā and kererū. Kākāriki are being seen more frequently. Spotted dove is a recent arrival.
- The Oruawharo Wetland project involved an initial vegetation survey (reported earlier)

- Pāteke and matuku hūrepo/ australasian bittern have been monitored and both species have maintained their numbers, though the latter is probably only a seasonal visitor. Mātātā/fernbird has been recorded once recently.
- Wetland restoration has involved pampas removal and other invasive species, and the planting of native species. Kikuyu grass is to be managed mainly by shading as planted trees grow.
- Ti kōuka/cabbage trees, harakeke/flax and mānuka have been the main species planted, but c. 700 plants of eleven different species have been planted.
- Extensive flooding by seawater in June 2021 resulted in death of many weeds including kikuyu grass. Established manuka at the northern end was also killed.
- Tree ring counts on the dead manuka established that the previous such flooding was c. 1997 and that mānuka should reach 3m height in c. 10 years.
- Since the flood, rooting by feral pigs has damaged drain edges but also created additional pools. Pigs are a conservation hazard that is being addressed.

INTRODUCTION

Background

Oruawharo Bay is located on the eastern coast of Aotea/Great Barrier Island. It has a small settlement of approximately 130 properties centred around a long white sandy surf beach named Medlands. Most dwellings are used as either private or rented holiday homes, with only a few permanent/semi-permanent residents.

The Oruawharo Bay landforms comprise four distinct ecosystems running parallel to the beach – (1) the beach itself, (2) the vegetated dunes, (3) the area of housing on the older more consolidated dunes, and (4) the wetlands and alluvial flats further inland. This report outlines the Oruawharo Medlands Ecovision (OME) Group's information-gathering, conservation advocacy and restoration work in each of these four areas. The aim is to communicate in some detail what we have learned in the three years of our operation.

Behind the main settlement area lies a mix of farmland and wetlands, with regenerating coastal shrub and native forest in the surrounding hills. The regenerating mānuka and native bush is a sanctuary for native birds such as kererū, tūī and kākā. In the wetlands there are matuku hūrepo/Australasian bittern and the rare, endemic pāteke/brown teal, while the foreshore provides a breeding site for two shorebirds - New Zealand dotterel and variable oystercatcher. At each end of the beach there are streams that wind their way from catchments in the surrounding bush clad valleys out to sea. These waterways are home to pāteke, tuna/eels and native fish such as inanga, bullies and kōkopu. The extensive dune system running the length of the foreshore consists of flora such as pohuehue (*Muehlenbeckia*), ngaio, harakeke (flax), karo, pohutukawa, spinifex and pīngao, providing habitat for moko skinks and the copper butterfly.

Fig.1: Biodiversity Focus Area Medlands, outlined in red. The photo also clearly shows the four parallel layers of ecosystems between the beach and Medlands road. The trapping lines on the dunes are also shown.

The biodiversity of Oruawharo Bay is threatened by ship rats, kiore, mice, feral cats and pigs, and a range of invasive weeds (eg pampas grass in wetlands and lupins in dunes). Rats and mice are present on Aotea in large numbers and as a result since the early 1900's several bird species have become extinct and are no longer found at Oruawharo. Other species, such as red crowned kākāriki, pūweto/spotless crake, matuku hūrepo/bittern and mātātā/fernbird are currently reduced to very low numbers due to pest species.

There are however many reasons to celebrate what we still have in Oruawharo Bay and even more reasons to protect, restore and care for all the different ecosystems and habitats. For example:

- the creeks and drains in the wetland and the Oruawharo stream near the campground are flock sites for pāteke which is a regionally prioritised species for restoration management;
- the wetland is a Biodiversity Focus Area (BFA). see Fig. 1;
- the endemic niho taniwha/chevron skinks live in the catchment;
- rare birds such as matuku hūrepo and mātātā have been spotted since our restoration efforts started;
- restoration work in the area aligns with the nationwide aim for predator free Aotearoa 2050.

Project phases

The first phase of the project covers the three years from late 2019 to late 2022. This is the period covered in this progress report. During this phase work has concentrated on engaging the community and obtaining adequate funding to support activities. The main activities have been centred around: (1) protecting and monitoring the beach birds, (2) conducting rodent control, especially on the dunes, and (3) restoration of the Oruawharo wetland. The second phase, commencing in 2023, will involve collaboration with the Windy Hill Sanctuary (WHS) , the Aotea Great Barrier Environmental Trust (AGBET) and the Tu Mai Taonga (TMT) project, and will greatly extend the area of OME activities. This will require significantly more resources than currently available.

The team and supporters

Oruawharo Medlands Ecovision (OME) comprises a group of like-minded locals who got together towards the end of 2018 to form a biodiversity focused ecological restoration project with the guidance and support of the Aotea Ecology Vision facilitator, Rendt Gorter. An earlier group - The Medlands Beachcare Group led by Alan Benson had created awareness of the special features of Medlands Beach that needed protection but had lost momentum with Alan's passing. The founding members of the 'Oruawharo Medlands Ecovision' group which had its first formal meeting as a committee on 27 June 2019 at Medlands Haven were: Annamarie Clough, Hemo Davis, John and Peggy Garlick, John Ogden, Lotte McIntyre and Michelle Benson.

Since then, several members have been added. Prue Smith and Andy Thomson, Tony Lyons, Vicky Kyan, Jennifer Neads and Raoul Stuart, Frances McClure and Kim Bannister, Margaret and Peter Jemmett as well as Margot and Mike Scott, who have now left the island. The initial roles were shared and Annamarie Clough took the lead as co-ordinator from the

outset, with Lotte McIntyre filling the field worker role. Annamarie set the standard high and got the group off to a great start. Annamarie has since passed the baton on to Lotte as co-ordinator and Selina Ward as field worker. In July 2022 a more formal structure to this committee was put in place and Raoul Stuart (chair), Peter Jemmett (deputy chair) and Prue Smith (secretary) were elected.

Funding

To facilitate its work, OME has been generously supported since its inception. The Aotea Local Board has given grants each year, totalling $67,500. Two more grant applications (for a community 'hub' and a pig trap) have recently been approved by them. In 2020 the Department of Conservation granted $70,800 to be used over three years for wetland restoration. Auckland Council have provided four grants from various funds amounting to $7,600 and have recently contributed $26,000 through the Community Coordination and Facilitation fund (CCF) towards facilitation of the Phase Two project, to extend aspects of the OME project out to Windy Hill. Additional amounts have come from other sources, including Walking Legends. This budget has been used to support the part-time OME project coordinator and field worker (Lotte McIntyre) but also for contracted work (Paradise Landscapes) on pampas extermination, purchase of plants, covers and tools for wetland restoration, and for community participation/education events. Lotte also runs the Aotea Trap Library and volunteers in all aspects of the group's work. Applications for grants and their facilitation are assisted by an umbrella organisation (Aotea Great Barrier Environmental Trust - AGBET). This group manages the budget and prepares annual audits, provides support and advice and helps with funding applications etc.

The committee is very grateful for this financial support. Without the funding the conservation progress documented in this report would not have been achieved.

Reporting and communication

The group coordinator organises committee meetings at roughly monthly intervals. Field days for planting and weeding in the wetland are weekly. Other meetings involving speakers and public participation are held periodically during the summer months when Medlands householders are present. Quarterly Newsletters are sent out to our members via mailchimp, or in person in December. OME provides reports on activities to funding bodies and AGBET, and writes items for the Barrier Bulletin. The Group also participates in other island-wide conservation activities.

Rat trapping and monitoring

An important objective of OME is to reduce the numbers of rats and mice within the project area of Phase 1. Details are presented under the relevant headings; here we give an overview of the trapping and tracking tunnel program and the overall results. Initially traps and tunnels were arranged in three lines on the dune system (Fig. 1.) and on each of the islets. A control line was set up at Ocean View Road, Kaitoke. Later traps were added in the Oruawharo wetland, and additional traps were placed along Sandhills road and elsewhere in the Medlands village area. Some local inhabitants assisted by having their own traps and submitting their catch data to the TRAPNZ database.

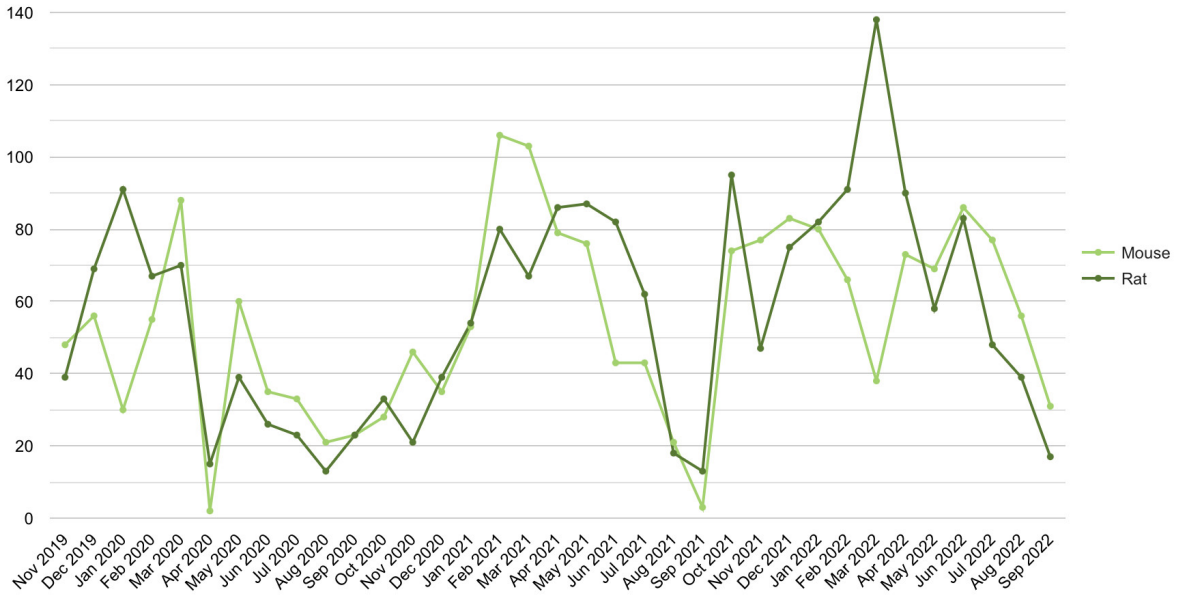


Fig. 2 Total catches of rodents, all areas, November 2019 – September 2022. Note that the low points in April and August 2020 and August/September 2022 were due to no data being obtained during Covid lockdowns.

All rodents caught (rats and mice) are reported each week to the TRAPNZ database (Fig 2). Unfortunately, the graph is hard to interpret, because the number of traps has increased over time, and because lockdowns due to the Covid epidemic resulted in traps being neglected at some dates. However, the expected seasonal pattern of higher rodent numbers in late summer (February – May), and lowest numbers in late winter (August – November) is reflected. Although rats and mice tend to follow a similar seasonal pattern, abundant rats generally dominate mice. Both seasonal synchrony and rat dominance are reflected in Fig 3: rats and mice increase together up to a point where rat abundance starts to depress mice, represented by rat catches >60 – 80 rats per month.

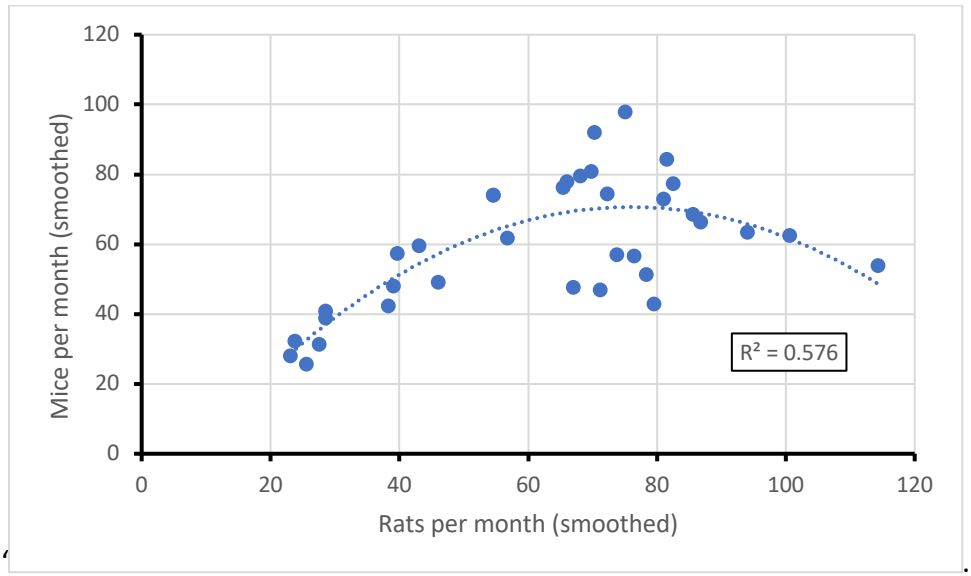


Fig. 3. Rats caught per month vs. mice, over three years in all traps. Each month's data smoothed by previous and following month, with Covid data interpolated. Fitted curve is polynomial 2.

This is particularly clear in Jan 2020 and March 2022. Over the whole project (including the wetland and kaitoke control) a total of 3932 rodents have been killed up to the time of writing. This number is almost equally divided between rats and mice.

Rodent catch data can be expressed as catch per 100 trap night (Catch/100TN), which is a standard method taking into account those nights when the trap was not available for capture because it was already sprung. This index is preferred over the raw numbers for comparisons between locations or times. Another monitoring method is to use tracking tunnels (TTs). The tracking tunnels do not kill rats or mice, they simply record animal visitor tracks on an ink pad. These pads are collected after one night and the tracks identified. The results are expressed as the proportion (%) of tracking tunnel pads with tracks of particular species. The tracking tunnels results, and the catch per 100TN should both reflect abundance (i.e. be correlated). This was indeed the case when tested for the dunes and islets (Fig. 4).

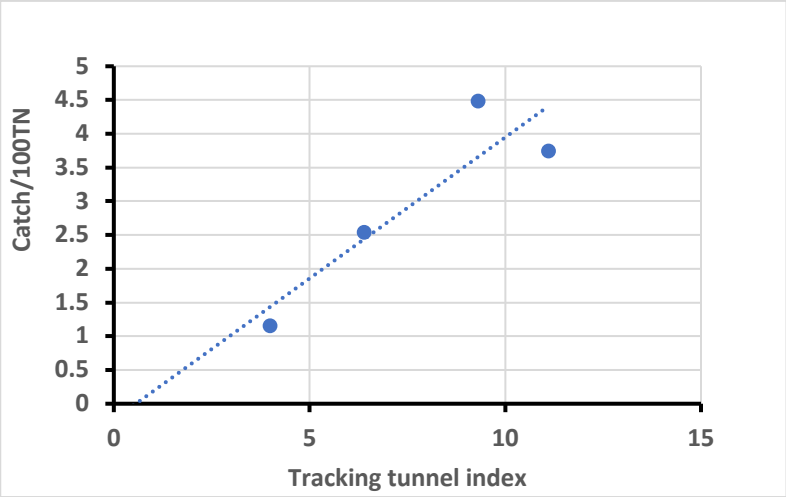


Fig. 4. Catch/100TN vs Tracking tunnel index (all rodents, all dates) for three dune transect lines and two islets (combined).

Consequently, in this report most attention has been given to the tracking tunnel (TT) data, because this also gives some preliminary information on lizards and larger insects which also leave tracks.

Overall, the catch/100 trap nights (<5), and the TT rodent index (mostly <10%) indicate relatively low rodent abundance (compared to un-trapped bush areas on Aotea, where TT%s between 40% and 80% are usual, and catch/100TN can be up to 60).

THE BEACH

Medlands Beach is the main attraction of the area for surfing, swimming, fishing, walking the dog and sunbathing during the summer months. At that time the local beach houses are almost fully occupied and the beach may have several hundred people present over the course of a day. Walking with pet dogs is regarded as an important use of the beach, but for conservation reasons both the dog-walking area and the timing of dog access needs consideration. The former has been addressed by the Auckland Council (Local Board) with improved but still confusingly different restrictions on different parts of the beach; there are no timing restrictions that might give the birds a dog-free window of time before Christmas in which to hatch their eggs. The OME has facilitated children's beach-care sign-writing days with the school holiday programme and some of the signs are now located along access paths.

The OME has run an annual sandcastle competition after New Year on the beach, and this has become a traditional 'fun' event for visiting families with children. It has also provided a low-key way for the group to talk to local bach owners about conservation activities. Prizes are awarded!

Except for the birds mentioned below, people and occasional dogs, the beach appears to be absent of life, but this is misleading because there are molluscs, crustacea and other tiny creatures in the wet sand below. Wood and seaweed, normally present on the upper beach in quantity, are a rich source of insects, amphipods (sand hoppers) and such like, providing food for birds.

The beach birds

The upper beach and dunes are important nesting habitat for the New Zealand dotterel and Variable Oystercatcher. The latter also utilises the two rocky off-beach islets. These two species have been a focus for OME and are dealt with in more detail below. Other species sometimes present on the beach include terns (Caspian and White fronted), and gulls (red billed and southern black-backed) especially near the southern (Oruawharo) estuary, where flocks of up to 80 red-billed gulls have been recorded. Two bar-tailed godwits were present in October 2019 and at least one stayed until mid-December. Pied shags frequent the pohutukawa trees at both Sugarloaf and Boulder Bay, with up to 12 at the former on occasions. Pateke/brown teal visit the upper beach in the north at night, fossicking among cast seaweed and driftwood for food.

In June 2022, twelve kororā/little blue penguin nest burrows were found at the southern end, in Boulder Bay and on Shakespeare point where two occupied grey-faced petrel burrows were also located by the DabchickNZ team of two canines and their handler, engaged by Auckland Council to do an island-wide survey. These two bird species are predominantly nocturnal visitors to their burrows, so their actual numbers are not yet known.

Aside from New Zealand dotterel and variable oystercatchers, the beach is often devoid of birds. The corpses of pelagic seabirds (and others) washed up by the tide are however fairly frequent, indicating that the off-shore avifauna is diverse (see below).

New Zealand Dotterel

The Northern New Zealand dotterel (*Charadrius obscurus obscurus)* is ranked "Threatened (Nationally Vulnerable)" and is dependent on conservation efforts for its continued survival. Those efforts constitute predator control and protection of nests from disturbance by people, dogs and vehicles. Since 2019 OME has had a role in all these activities: trapping rodents, erecting tape fences around nests, putting up notices about dogs, and talking to pet owners and anyone inappropriately taking a vehicle onto the beach.

A count of dotterels on all Aotea beaches has been undertaken annually in March (post-breeding) since 2000. March is not ideal for assessing the local population changes, because after breeding the Medlands birds generally leave, either to join the aggregation on Okiwi Spit, or to Coromandel. However, from 2000 to 2010 the Aotea wide (March) dotterel count never exceeded three birds on Medlands beach. In six of those years no birds were seen on Medlands beach on the count day. Since then, counts have generally increased, and markedly so since 2018 (Fig.5.). This positive outcome might be attributable to an increased dotterel population consequent on the raised level of public awareness, especially about dogs, since the OME team started talking to people and initiated new Council dog notices on all the main access points. On the other hand, some of the Medlands breeding birds and/or their offspring might be leaving later for some unknown reason.

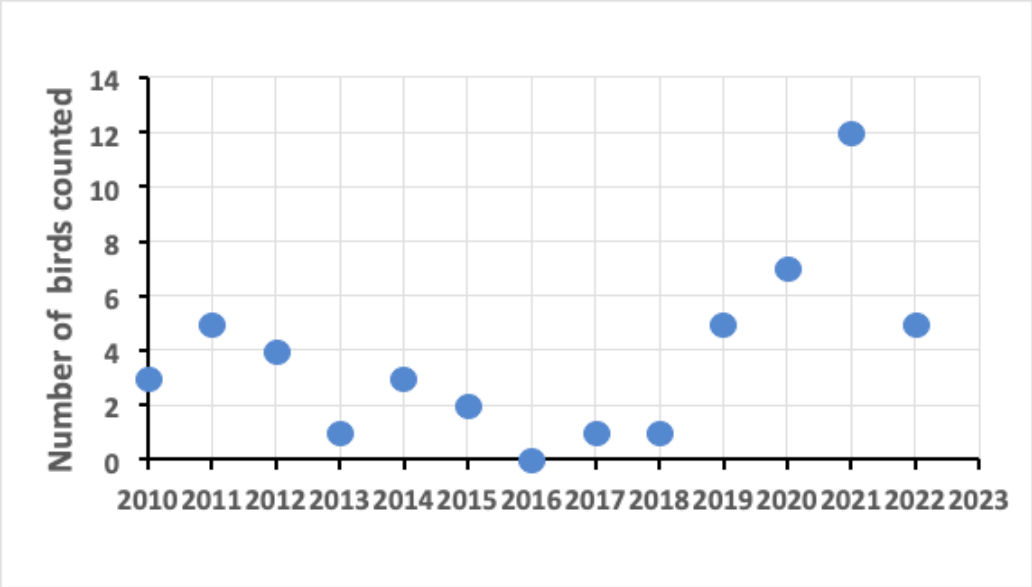


Fig.5. Post-breeding (March) New Zealand dotterel numbers on Medlands beach 2010 – 2022.

New Zealand dotterels are monogamous. Most pairs are absent from Medlands during the winter months, but return in August or September. The nest is a scrape in the sand, usually not far above the mean high-tide mark, but sometimes in the dunes. The first eggs are usually laid in October, and chicks are present from mid-November onwards. If the first nest fails, the pair nest again, resulting in small chicks being on the beach during the Christmas holiday period. These tiny birds must have access to wet sand below the high tide mark for their food supplies, so they are extremely vulnerable to disturbance by people and dogs.

Table 1. *Breeding of New Zealand dotterel and approximate productivity at Medlands Beach 2019 – 22. Nr, not recorded.*

Season	**2018 -19**	**2019-20**	**2020-21**	**2021-22**	**Average**
Pairs	4	5	7	5	5.25
Known chicks	7	9	11	nr.	
Fledged	3	3	3	5 or 7	4
Productivity (average offspring/pair)	0.75	0.6	0.4	1.4	0.8

Since the 2018-19 summer season there have been at least 4 pairs actively breeding each year, with a maximum of 7 pairs present in 2020-21 (Table 1.). However, despite at least 11 hatched eggs (probably more) that year, only 3 chicks were known to have reached fledging. The annual productivity (fledged young/pair/year) has averaged c. 0.8 (range 0.4 – 1.4), which is less than that achieved by one or two pairs at Awana between 1991 and 2012 (1.17, range 0.96 – 1.4; Ogden & Dowding 2013). However, keeping track of growing chicks from several nests is not easy when the beach is crowded with people. The dotterel productivity at Medlands beach might be under-estimated. As each pair must successfully produce at least two nesting adults over their lifetime to maintain a stable population, the current productivity data suggests that each pair must breed successfully at least three times. Adult survivorship probably averages c.4 years on Aotea, so the productivity data suggest a stable or increasing dotterel population, especially as some birds live much longer than average (Ogden & Dowding 2013).

Dotterels and dogs

People generally cause little direct disturbance to nesting birds, though their dogs do so (Lord et al. 2001). The presence of a dog anywhere on the beach generally causes New Zealand dotterels to leave their eggs if they are incubating, which renders them vulnerable to predation by gulls or over-heating in the summer sun. Small unfledged chicks of dotterels and oystercatchers are also vulnerable to predation by dogs and to human presence which can hinder them getting to low-tide food supplies during the day.

It has been notable that during the OME period, a pair of dotterels (and a pair of oystercatchers) nesting at Boulder Bay have usually been successful. Although the available nesting area there is very small, this bay is much less frequented by people and dogs. However, the dogs on the northern beach remains a potential problem: In 2020 three almost fledged Oystercatchers were killed by a dog near Memory Rock.

Variable Oystercatcher

This species is not threatened nationally and is common and increasing along the Aotea shore lines. The Medlands birds usually commence nesting in October and chicks are invariable present from early December until about March. Pairs are mainly monogamous and some birds and their fledged young remain over the winter, although most probably join the main flock on Okiwi Spit.

One of our members, Peggy Garlick, has kept a detailed record of the oystercatchers and knows the pairs from their different colour patterns – presumably as they know each other. She reports as follows:

Five (sometimes six) pairs are present every year (Table 2). The pairs occupy quite well-defined sections of the beach, and although they may tolerate visits from other birds, they invariably make a fuss about that. The pair at the northern end have failed to nest during the 2019 – 22 period, although in October 2020 they 'took over' a New Zealand dotterel nest, and incubated the dotterel eggs and defended them for over a week, at which time the nest was completely buried by drifting sand in a storm. (An almost identical occurrence has been observed at Awana). The pairs at Boulder Bay, and on Memory Rock have nested each year and generally been successful in fledging at least one chick, but in the 2019-20 season the latter pair had their offspring killed by a dog just before fledging. Overall, the annual productivity per pair is similar to that of the dotterels, but as they are probably longer lived, this is adequate to maintain the population. Visiting pairs (such as the sixth pair present in 2019-20 season) are "seen off" by adjacent birds and fail to nest.

Table 2. *Breeding of Variable Oystercatcher and approximate productivity at Medlands Beach 2018-22*

Season	**2018 -19**	**2019-20**	**2020-21**	**2021-22**	**Average**
Pairs	6	6	5	5	5.5
Nests	4	3	3	4	3.5
fledged	4	3	3	5	3.75
Productivity (av. offspring/ pair)	0.7	0.5	0.6	1.0	0.7

Beach wrecks of interest

The OME group has maintained an irregular watch for birds washed up dead ('beach-wrecks') on Medlands and nearby beaches. From Jan.2020 to Dec.2021, sixty-six beach wrecks were reported, belonging to eighteen mainly pelagic species. The most unusual on Medlands Beach were Hutton's shearwater from the Seaward Kaikoura Range, and White-tailed tropic bird from the tropical Pacific Islands (2022). (Table 3). Both these are 'first records' for Great Barrier Island. White capped mollymawk may also be a first record because other mollymawks have not always been certainly identified. The bird recorded here was an adult with 2.55m wingspan.

Table 3*. Unusual beach-wrecks 2020 – 2022.*

Name	**Latin**	**Year**	**Month**	**Location**	**Nearest breeding location**
Hutton's Shearwater	*Puffinus huttoni*	2020	Sept.	Medlands	Seaward Kaikoura Range. S. Is. NZ
Royal Albatross (Southern)	*Diomedia a. apomophora*	2021	March	Kaitoke	Auckland Islands (sub-Antarctic)
Giant Petrel	*Macronectes giganteus*	2021	June	Kaitoke	Macquarie Island (sub-Antarctic)
White capped Mollymawk	*Diomedia cauta steadi*	2022	May	Medlands	Auckland Islands (sub-Antarctic)
White-tailed Tropicbird.	*Phaethon lepturus*	2022	March	Medlands	Rarotonga

File = DB 16-20 incl.FIN monthly NEW (version 2).

THE DUNES and islets

The dunes belong to two age series. The dunes between Sandhills Road and the beach, are predominantly white/grey sand of Holocene (last 10,000 years) age. Most of these dunes are stabilised by vegetation. In the area with holiday homes landward of Sandhills Road. a thin skim of this sand (< 1m.) is underlain by a finer consolidated brown sand (almost 'clay') of a much older dune system, probably > 45,000 years, relating to an earlier sea-level rise during the previous Interglacial period. These two substrates provide soils of very different fertility and structure and only the latter has been built upon and is highly modified for gardens etc. It will be considered separately for that reason.

Although very different, for comparative purposes the two off-shore islets (Memory Rock and the Boatshed islet at Oruawharo) are included in 'the dunes'.

Fig. 6. Location of traps and TT Monitoring lines in yellow, trap locations marked by red dots.

Vegetation of the dunes

The OME group has not yet made a formal survey of the dune vegetation, which covers c. 100 ha. However, the main native species are known. Exotic plants, many of them garden escapes, are a feature of the dunes but generally regarded as unwanted weeds. Curiously this view does not extend to trees – for example a few true pines (*Pinus* spp.) and Norfolk pines (*Araucaria heterophylla*) are regarded favourably.

Within the dune system there is a gradient from the beach inland, and a similar gradient from north to south. This latter arises because long-shore drift causes more sand to accumulate at the north, so that the sand surface there is more recent and the vegetation more open. The whole system has probably accumulated since sea-level stabilised c. 7000

years ago, and over this time the northern end has got wider and the dunes there built a higher profile.

When Europeans arrived here the dunes would have included also the older dunes to the west of Sandhills Road, now cleared, subdivided, and with houses and other buildings. Most of this whole area was forested, predominantly by pohutukawa, but with other tree and shrub species also, especially on the older inland areas. The forest was cleared for firewood and to create grazing land, while the back-swamps were drained for the same reason. The two large pohutukawa on the northern dunes (Pohutukawa Lookout) are remaining evidence of this forest cover, but better remnants have survived on the two islets. In this preliminary description the dune area is divided into three, coinciding roughly with the three rodent trapping lines established by OME in 2019.

The northern dunes (Sugarloaf Creek to Pohutukawa Lookout).

This is the widest section of the dunes, with two fairly distinct dune ridges separated by an irregular swale. From the beach landwards the first plants are sea rocket (*Cakile maritima*), coastal convolvulus (*Calystegia soldanella*) and Spinifex grass (*Spinifex hirsutus*). The latter species predominates as scattered clumps and trailing stems on the open sand of the first dune, with the addition of rosettes of hawkbit (*Leontodon* spp.) and the introduced pink flowered *Senecio elegans* (though the latter is being removed by Council employees). Patches of Pingao (*Ficinia spiralis*) occur here also.

Moving inland across the first swale the spinifex is bigger and forms tussocks. Introduced tree-lupins are common, with an admixture of other exotic herbaceous weedy plants. Pohuehue (*Muehlenbeckia complexa*) – the predominant vegetation cover of the whole dune area – usually first makes its appearance on the seaward side of the second dune, with more lupins and scattered small karo (*Pittosporum crassifolium*). This cover gets taller and denser on the landward side of the dune up to Sandhills Rd. *Muehlenbeckia complexa* is replaced in some areas by larger leaved *Muehlenbeckia australis* and invaded by the climbing dock (*Rumex sagittatus*). The pohuehue cover can be over 1m in depth; difficult to penetrate for humans but ideal cover for rodents and lizards. However, where it has been disturbed by humans or feral pigs, exotic grasses and weeds cover the ground, especially aggressive kikuyu grass (*Pennisetum clandestinum*).

The effects of pig rooting can be seen seawards of the two Pohutukawa, where a former cover of pohuehue and coastal convolvulus has been largely – though perhaps temporarily - replaced by kikuyu grass and lupin seedlings. A few native shrubs are present close to the pohutukawa, kawakawa (*Macropiper excelsum*), karo, coastal fivefinger (*Pseudopanax lessonii*) and coastal mahoe/melicytis novae-zelandiae.

The central dunes from the main dune access at Oruawharo Lane, to the twin pines, including Memory Rock

This stretch includes the main access points for the beach. Excepting a few blow-outs there is relatively less open sand dune, and the pohuehue cover extends from Sandhills Road almost to the foreshore. Although a narrow coastal fringe of spinifex is still present, most of that zone appears to have been eroded away. There are several planted Norfolk pines (*Araucaria heterophylla*) which reach c.10 m in height and create a ‘nurse’ environment for some native forest species – predominantly karo. A few mature ngaio (*Myoporum laetum*) and young pohutukawa and karo are present, and one large introduced Tahitian hibiscus. A

native cabbage tree (*Cordyline australis*) and some clumps of introduced Aloes and Arum lilies are present. The car park and path to the beach feature several introduced annual grass species in the genera *Vulpia, Aira, Lagurus* and *Briza,* and the tiny South African lily, *Romulea longifolia*.

Memory Rock

The small area of remnant vegetation on Memory Rock has been extensively modified and planted with exotic species, but still contains some 35 species of native herbaceous and woody plants, and six native ferns (Cameron 2015). This gives an indication of the species diversity that would have been present in the original coastal forest on the dunes. Cameron's inventory also includes 37 naturalised exotic species arriving during European times, of which at least nine were probably planted by Grace M. Medland and her sister in the 1880s, when they were creating 'Memory Park' for the family.

The southern dunes from twin pines to Oruawharo Creek boat access

This is the narrowest section of the dunes and is mostly covered in pohuehue, but has a higher frequency of young karo, kawakawa and pohutukawa, suggesting succession to a forest cover in future. There is one prominent *Pinus radiata*, and some large Aloes. Along Sandhills road kikuyu grass, buffalo grass (*Stenotaphrum secundatum),* European weeds and garden-escape plants are present. The foredune spinifex zone is very narrow, except near the Oruawharo creek/Waitematuku, where the dunes are more disturbed by wind-blown sand, people and vehicles. The vegetation on the islet referred to here as Boatshed rock, has not been described.

Boatshed Rock has a pohutukawas canopy, karo and Astelia, but also clumps of pampas, introduced succulents and aloe species and fresia.

Birds of the dunes

The dunes have no characteristic bird species, but are not devoid of birds. When the pohuehue is fruiting small flocks of finches (especially greenfinches and goldfinches), silvereyes and house sparrows occur, and even red-billed gulls sometimes feast on the small whitish fruit. Greenfinches also visit for spinifex seeds in autumn. Skylarks sing above the dunes in spring and the rather similar New Zealand pipit can be seen especially in the more open areas at the north end. Other bird species are casual visitors or fly over the dunes. Pukeko and moho pererū/banded rail enjoy the pohuehue for food and shelter.

Insects and other invertebrates

Spiders, small moths and ants are frequent in the pohuehue, but a survey of the invertebrates on dunes has not been made. However, the native Copper butterfly Pepepara riki (*Lycaena spp.*) is fairly common (photo). This insect is dependent on pohuehuhe as the food plant for its larvae. It may be at risk through predation by wasps, especially the Asian wasp which is sometimes frequent on the dunes.

Large creeping insects can leave tracks on TT pads. In the dunes, these marks are predominantly cockroaches, which are also found abundantly under the unduline squares. It is likely that these insects are a significant food source for mice, and may be why mice appear to be so abundant in this habitat as discussed next.

Lizards on the dunes

The TTs recorded lizards in <1% of cases. However, both Moko skinks and copper skinks could be identified from their prints and have been seen under squares of Unduline (synthetic corrugated sheeting) laid out in several locations on the dunes. These are a monitoring device because skinks will frequently rest beneath them, but so far no results are available.

Rats and mice on the dunes– tracking tunnel results

Rat trapping and monitoring on the dunes and the two off-beach islets (memory Rock and the Boatshed islet) has been carried out since the inception of the project. In total 126 rat snap-traps have been monitored weekly, and 38 (now 40) tracking tunnels monitored for one night every three months on the Medlands dunes and islets. A further line of 10 tracking tunnels was situated on the vegetated (manuka) dunes behind the houses on the northern side of Ocean View road, to act as a control.

Although both kiore and ship rats were identified this distinction was not made consistently throughout the three years, and often specimens were not certainly identified. Consequently, although the two rat species are known to interact antagonistically and to have different ecological preferences and probably interact differently with mice, they are lumped together as 'rats' here. The available data indicate that > 33% of the rats were kiore.

Comparison with control line at Kaitoke Beach

There appear to be significantly more mice on the Medlands dunes compared to the controls, but possibly fewer rats (Fig. 7). Note also that both lizards and insects might be less abundant on the Medlands dunes, but the difference is not statistically reliable. The control site has become less useful during the three years of study because a local inhabitant nearby has commenced rat trapping!.

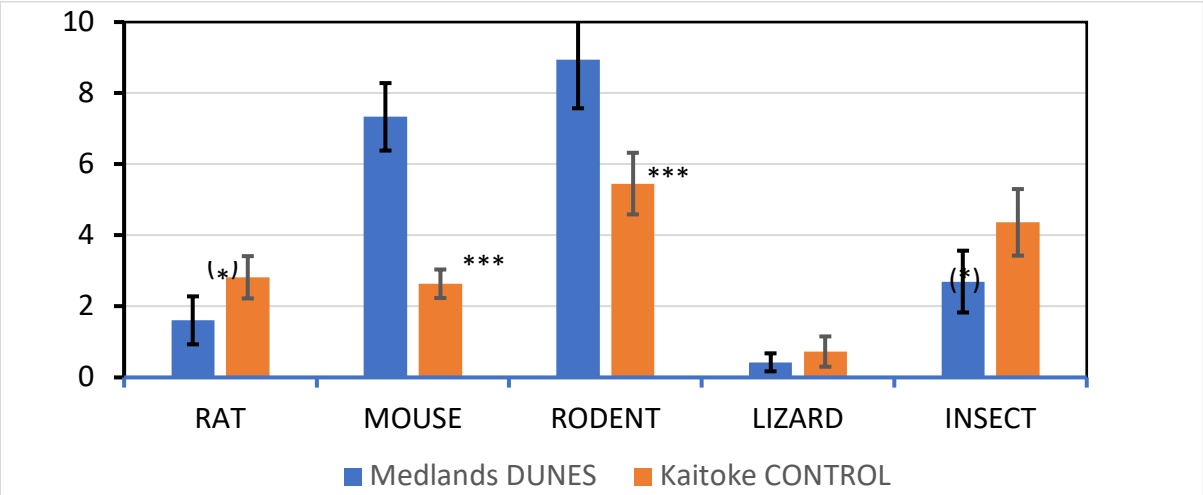


*Fig. 7. Averages (±95% Confidence bars) from 10 tracking tunnels at each site (i.e. multiply by 10 for percentage tracking tunnel presence). Rodent is the sum of mice and rats. Key to statistical significance from T tests (dunes v. control): (*) P<0.1, * P<0.05, ** P<.01, *** P<.001*

Trends within the dune system

There are three lines, each of ten tracking tunnels on the dunes. Line A is situated at the northern end, close to the sea in open spinifex/lupin vegetation. Line B is in the middle section (south of main beach access). Line B vegetation is mainly pohuehue. Line C is at the southern end and in pohuhue and karo vegetation closer to the road and dwellings. Thus, the N-S arrangement is confounded with vegetation cover, distance from sea and proximity to dwellings. However, despite that design weakness, some tentative conclusions are possible.

The TT results suggest significantly fewer rodents in the northern dunes compared to the central and southern sections (Fig. 8). This could be because rats and mice prefer the denser pohuehue cover to the spinifex and lupins and/or find more food in the pohuehue and karo vegetation. (Karo seeds are very attractive to rats).

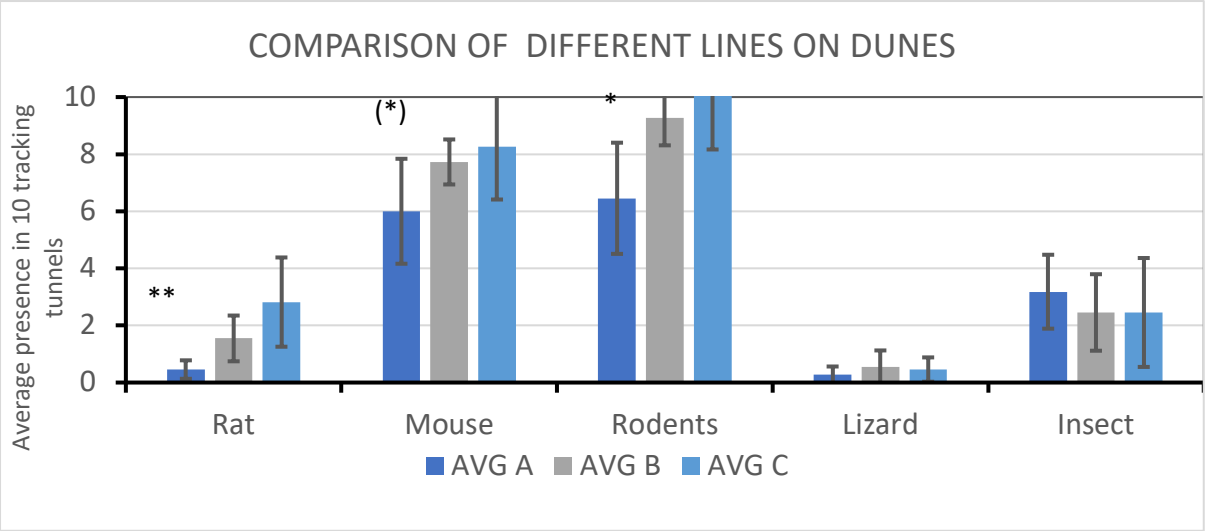


*Fig. 8. Trends from line A to line C on the dunes. The significance of the trend is indicated by * as in Fig.7 from t-tests between data for line A and line C. The error bars are 95% C.L.*

Comparison with islets (Fig. 9).

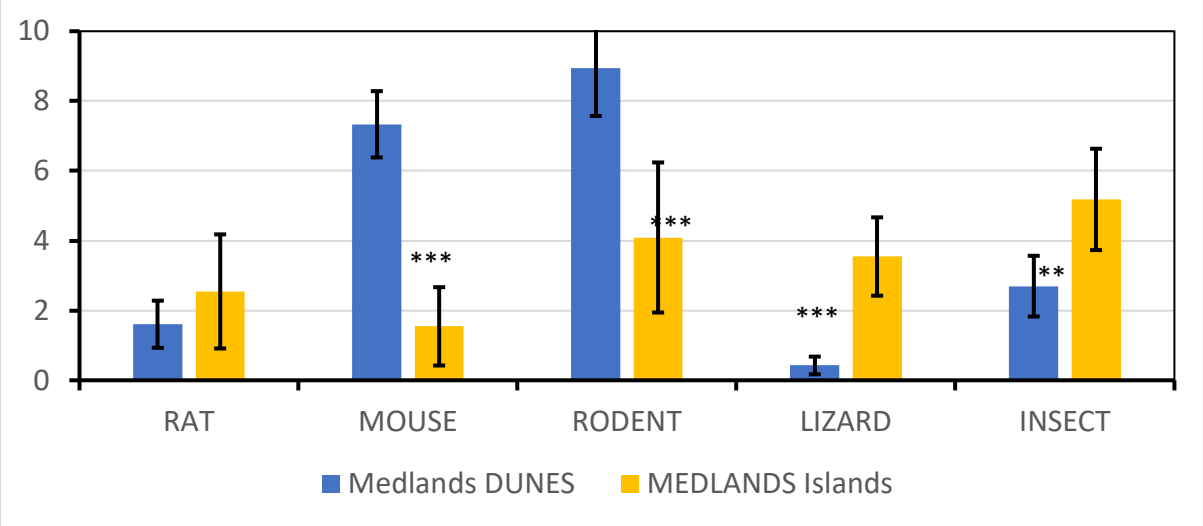


Fig. 9. Medlands dunes compared to Medlands Islands (Memory Rock MR and Boat Shed MBR, total n = 10)

Mice presumably have more difficulty than rats crossing the tidal areas to get to the islets, and their numbers there appear to be considerably less than on the dunes. Perhaps as a consequence, both lizards and insects appear to be more abundant on the islets. As noted earlier, the vegetation of the islets is much more diverse in structure and species composition than the dunes, and this too will favour insect and lizard abundance.

Taken overall, both insect and lizard presence in tracking tunnels appears to be negatively related to mouse presence, implying that mice are preying on the larger insects (cockroaches) and probably also lizards. The insect data for the dunes and islets are summarised by season in Figs 10 and 11. High mice numbers (Feb - May) generally coincide with lower insect traces, and vice-versa in August – November. However, the correlation shown in Fig. 11 is barely significant and certainly should not be interpreted as cause and effect without clearer evidence.

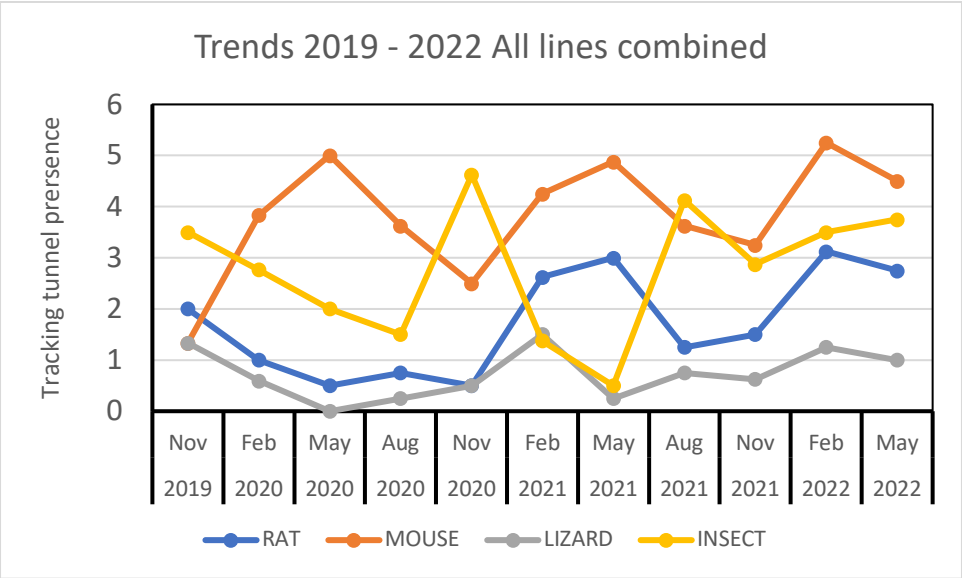


Fig. 10. Seasonal and annual fluctuations in abundance (TT%).

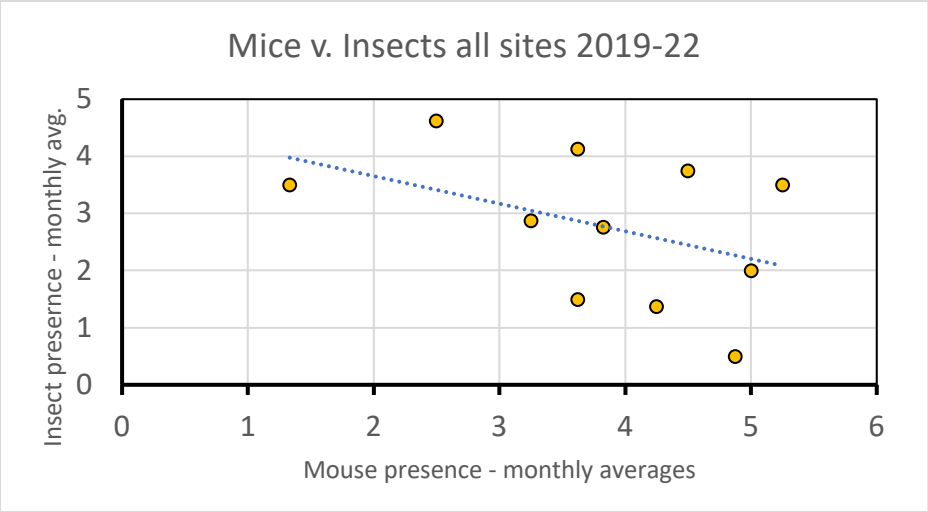


Fig. 11. Negative correlation between mouse and insect abundance signs in TTs.

Catch/100 trap nights.

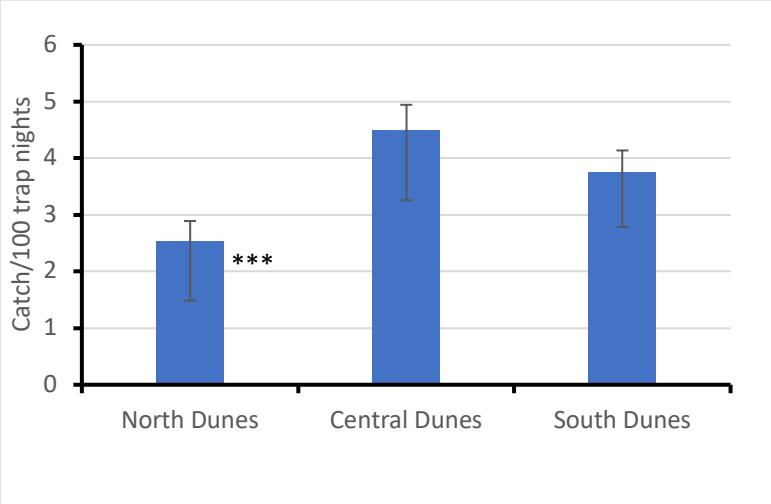


Fig. 12. Average catch/100 trap nights (all rodents), with 95% confidence limits

As anticipated from the tracking tunnel results, the catch/100TN was significantly lower on the northern trap line compared to the central and southern lines, which were not significantly different from each other (Fig. 12). From November 2019 to end of September 2022 1,671 rats and 1,832 mice have been caught in traps on the dunes and 74 rats and 12 mice on the islets, none of the mice were caught on Boatshed Rock.

THE VILLAGE

The settlement area at Medlands – the village – is c. 2 x 0.5 km in area, excluding the more scattered houses to the south of Oruawharo Creek and those up Mason Road to the west. . There are c130 houses mostly strung out along Sandhills Road. Most of these are holiday homes inhabited periodically. The number of houses has increased considerably over the last few years, with at least seven currently under construction or extension. A door-to-door survey in the 2020 -21 summer indicated that many of the summer visitors are supportive of the objectives of OME, and are particularly keen to see a reduction in rats, mice and pigs, all of which cause problems for their food supplies and gardens.

There is no shop at Medlands excepting the community opportunity shop associated with the Church. The Church is multi denominational and owns a nearby house used for many community functions. There is a brewery and occasional bar on Masons Road and two council reserves on Sandhills Road, one of which, near the twin-pines car park, has community facilities including barbeques, and is in frequent use. There is also a community vegetable garden, which is supported by OME members.

Some local residents undertake rat-trapping for at least part of the year and these results are added to the OME project data stored in TRAPNZ. Murray Staples provides a rat baiting service to several Medlands properties on demand. OME is keen to involve more owners in rodent eradication. One OME member, Tony Lyon, has trained in the eradication of wasps and has eliminated wasp's nests brought to his attention as well as undertaken a Vespex program for elimination of vespular/german wasps. Auckland council undertake annual surveys for Argentine ant presence in the area and are attempting to eradicate them.

The dune system, especially the older consolidated dunes on which the houses have been built, forms a barrier between the wetlands further inland and the beach. Consequently, there is a flow of water beneath them, creating one or more aquifers. These are currently being exploited by an increasing number of householders. Although no comprehensive geological examination of the aquifer situation appears to have been undertaken, anecdotal information suggested considerable draw-down during the 2021-22 summer. Elsewhere on coastal dune systems, uncontrolled bore use has caused salt-water to invade the exploited aquifer. This not only renders it useless for human use, but can also lead to the death of the vegetation cover and re-mobilisation of the sand dunes. With a potentially rising sea-level, and more water inland, the sustainability of the aquifer(s) merits assessment.

Birds in the Medlands village area

Since the AGBET re-initiated the Annual Bird Count (ABC) in December 2019, each year members of OME have participated. These three years of monitoring indicate that our count transect has the highest bird species richness of any of the eighteen transects throughout Aotea. This is presumably because the transect line, along the road causeway between Mason's Road and the Quarry, passes by a variety of habitats: gardens, wetland, paddocks and manuka scrub. The inhabited area doubtless contributes a large number of introduced species, but native birds are also frequent. Twenty-three species were recorded in the 2021 count, but 42 species are listed in Table 4 as potentially present in gardens and the nearby wetland.

Spotted dove is a recent arrival at Medlands from Auckland. Kākāriki have been observed in several gardens and could be increasing on the Island. Longtailed cuckoo is probably an

occasional visitor on migration, while the pipit (which may be declining) can be mistaken for skylark; although characteristic of the dunes it is often seen on roads.

Table 4. *Bird species present in the Medlands village area, excluding beach birds and marine species. Some species found only in the Oruawharo wetland are included.*

Species: English name	**Maori name**	**Scientific name**	**Notes**
Bittern, Australasian	Matuku	*Botaurus poiciloptilus*	Visitor – wetland. Rare.
Blackbird	Manu pango	*Turdus merula*	Common
Chaffinch	Pahirini	*Fringilla coelebs*	Common
Crake, spotless	Pūweto	*Porzana tabuensis*	Possible in wetland
Cuckoo, long-tailed	Koekoeā	*Eudynamys taitensis*	Seen S. end – late summer
Cuckoo, shining	Pīpīwharauroa	*Chrysococcyx lucidus*	Gardens etc September - March
Dove, spotted		*Streptopelia chinensis*	A few. First record 2020 Medlands
Duck, grey	Pārera	*Anas superciliosa*	Mainly Mallard hybrids
Dunnock		*Prunella modularis*	Rarely seen but probably present.
Fantail	Pīwakawaka	*Rhipidura fuliginosa*	Common
Fernbird	Mātātā	*Bowdleria punctata*	Possible in wetland
Goldfinch		*Carduelis carduelis*	Common
Greenfinch		*Chloris chloris*	Common
Grey warbler	Riroriro	*Gerygone igata*	Common
Gull, red-billed	Tarāpunga	*Larus novaehollandiae*	Common
Harrier, Australasian	Kāhu	*Circus approximans*	One or two usually
Heron, white-faced	Matuku moana	*Egretta novaehollandiae*	One or two - wetland
Kākā	Kākā	*Nestor meridionalis*	Frequent in summer. Present all year
Kingfisher	Kōtare	*Todiramphus sanctus*	Influx in Sept-Oct. but present all year
Magpie, white-backed	Makipai	*Gymnorhina tibicen*	A few present in farmland
Mallard		*Anas platyrhynchos*	Common breeding
Morepork	Ruru	*Ninox novaeseelandiae*	Common
Myna, common		*Acridotheres tristis*	Common around houses. Roost
Oystercatcher, variable	Tōrea pango	*Haematopus unicolor*	Fly over from beach
Parakeet, red-crowned	Kākāriki	*Cyanoramphus novaezelandiae*	Several records since 2019
Pigeon, New Zealand	Kererū	*Hemiphaga novaeseelandiae*	Common
Pipit, New Zealand	Pīhoihoi	*Anthus novaeseelandiae*	Sparse on dunes and road
Plover, spur-winged		*Vanellus miles*	Common - paddocks
Rail, banded	Moho pererū	*Gallirallus philippensis*	Common in gardens
Redpoll, lesser		*Acanthis flammea*	? (Seen at Kaitoke)
Shag, little	Kawaupaka	*Phalacrocorax melanoleucos*	Wetland
Shag, little black	Kawau tūī	*Phalacrocorax sulcirostris*	Wetland
Shelduck, paradise	Pūtangitangi	*Tadorna variegata*	2+ pairs in wetland
Silvereye	Tauhou	*Zosterops lateralis*	Common flocks

Skylark	Kaireka	*Alauda arvensis*	Present on dunes and grassland
Sparrow, house	Tiu	*Passer domesticus*	Common
Starling		*Sturnus vulgaris*	Common
Swallow, welcome	Warou	*Hirundo neoxena*	Abundant over wetland
Teal, brown	Pāteke	*Anas chlorotis*	Present in wetland
Thrush, song		*Turdus philomelos*	Common
Tūī	Tūī	*Prosthemadera novaeseelandiae*	Common
Yellowhammer		*Emberiza citrinella*	Present

THE WETLANDS

Fig. 13. The Oruawharo Reporepo, after heavy rain filled the pools

The Oruawharo dunes blocked the original drainage from the hills, forcing the two main streams to enter the bay at the northern (Sugarloaf) and southern (Waitematuku) extremities. Between these two meandering creeks a linked system of wetlands and lagoons developed. Most of this was drained in the early attempts to farm the area by Europeans in the early 20th century. The remaining swampy area at the northern end is designated 'Medlands Wildlife Management Reserve' by the Department of Conservation and a 'Biodiversity Focus Area' by Auckland Council. This area, referred to sometimes as the Oruawharo Reporepo/wetland has been the main focus of OME, for bird monitoring, water quality, weed reduction and the planting of native trees, flax and sedges.

Preliminary vegetation survey of Oruawharo Reporepo (2020)

OME completed a preliminary vegetation report[1] on the southern end of the wetland in February 2020, when the water-table was below 50cm and the site exceptionally dry. The two main vegetation types, dominated respectively by *Typha orientalis* (raupo) and *Baumea articulata* (jointed twig-rush) (Fig. 15) were associated with differences in sediment depth, suggesting control by hydrological history (water depth over time). Although these two native species were visually dominant, introduced weeds comprised c. 80% of the 30 plant species on the transect line. More non-native species were recorded on the adjacent dune edge, including a large patch of the invasive cape honeysuckle (*Tecoma capensis*) spreading from the Sandhills (Council) Reserve. The northern end of the wetland was clearly different to the surveyed area, being dominated by manuka (*Leptospermum scoparium*) c. 4m tall, with a ground cover of sedges and rushes (*Schoenus tendo*, *Baumea* spp., *Juncus* spp. and umbrella sedge *Cyperus* spp.). Due to difficulties of access across the drains and Sugarloaf

[1] Preliminary survey of the biota and stratigraphy of the Department of Conservation Wetland at Medlands, Great Barrier Island. Oruawharo Medlands Ecovision Group. February 2020.

creek, this area has not yet been surveyed. The main drain (with a culvert under the main road) diagonally bisects the two areas mentioned. At the time of the initial survey in 2020 this central area was dominated by numerous tall clumps of pampas grass (*Cortaderia pampas*) hindering access.

Fig 14. Map of Oruawharo Wetland showing contours and approximate location of transect line (red) for initial vegetation survey . The main drain (green) runs vertically near the centre of the photograph. The grey between road and the beach houses at the north is the manuka covered area. The Muhlenbeckia dunes and the beach are to the right. The creek reaches the beach at top centre.

Fig. 15. *Typha orientalis* (left) and *Baumea articulata (*right)

Vegetation changes 2020-22

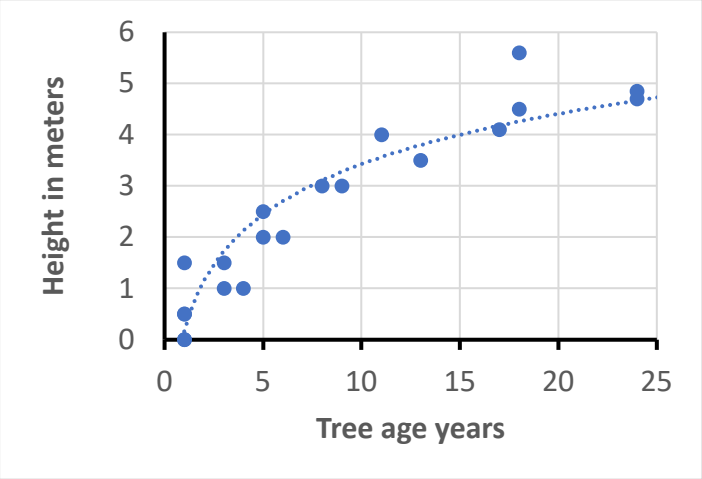
Fig 16. Dead manuka beside main drain junction. Pateke flock site.

In early June 2021 strong easterly gales coinciding with high tides forced sea-water much further up the Oruawharo and Sugarloaf creeks than normal, resulting in salt-water flooding throughout the Oruawharo Reporepo. Moreover, the creek outlet was blocked by sand, so the saltwater was retained and augmented by heavy rain causing the whole swamp area to be submerged for several weeks. A consequence was extensive death of many plant species, especially introduced grasses (kikuyu) and other weeds. Also the manuka cover of the northern end of the swamp was killed by the saltwater, and is now almost entirely standing dead.(Fig 16). Drying of the system has been very slow, and several large pools are still evident (Sept. 2022). Feral pigs have invaded from adjacent land to the north, and by rooting out raupo rhizomes and digging for food, have contributed to vegetation change.

Meanwhile contractors working for OME have eliminated many pampas clumps, and OME volunteers and council employees have reduced other prominent invasive weed species. Consequently, the vegetation pattern, and overall appearance of the wetland, has changed dramatically since the OME project began. Fortunately, tree-planting in the wetland did not commence until after the 2021 flood.

Mānuka dieback

Following the June 2021 flooding most of the mānuka covering the northern 3-4 ha. of the swamp died and has not recovered. As the mānuka collapses over the next few years the area may become vulnerable to weed invasion – especially pampas from the nearby quarry. This will require careful monitoring and possible intervention. Ring counts on sections from these trees indicate that they were c. 24 years old, suggesting that no event similar to the 2021 flood has occurred since c. 1997, when a similar flooding is known to have occurred at Whangapoua Estuary. Sections cut from three of the dead trees at 1m height intervals were sanded and ring-counted to provide height growth rates for manuka on the site (Fig. 17).



The curve in Fig 17 indicates rapid growth over the first 5 to 10 years, but slowing after that. Maximum height might be c. 6m, and longevity (between flood events) possibly c. 25 years.

Fig. 17. Height growth of mānuka since c. 1997 on Oruawharo wetland.

Water quality

Since the beginning of 2020 quarterly Waicare sampling has been carried out in March, June, September and December. Waicare is an on-the-spot kit with tests for temperature, PH, turbidity, nitrate, dissolved oxygen and phosphate levels. There is an upper freshwater creek site and a lower estuarine site for both Waitematuku and Masons Road/Sugarloaf creeks. Results are entered into the Auckland wide database for Waicare. Another element of this testing is looking for macroinvertebrates and fish in the creeks, which give a good Indication of the stream's health (Figs 18 to 21. All the results to date have been within the guidelines for healthy streams, despite blocked creeks and heavy rains.

Auckland Councils Safeswim sampling over the summer months revealed avian and ruminant animal markers with high E.coli and enterococci readings in the Waitematuku lagoon on occasion, especially after heavy rain.


Fig. 18 flat mayfly


Fig. 19 smooth cased caddisfly.


Fig. 20 spiny gill mayfly.


Fig.21 freshwater mussel shell

Planting: trees, flax and other plants.

Fig 22. Restoration planting in kikuyu, and some of the team ready for work.

The first planting carried out in October 2020 was in a small area close to the Oruawharo foot-bridge at the southern end of Medlands. This area had been planned for a picnic table which was erected by Auckland Council and the Local Board in February 2022..Over a hundred plants, comprising a mix of rengarenga lilies (*Arthropodium cirratum*), native toetoe (*Austroderia* spp.), mountain flax (*Phormium colensoi*), turutu (*Dianella nigra*), karo (*Pittosporum crassifolium*) and nikau palm (*Rhopalostylis sapida*) were planted by 12 volunteers over two weekends. The karo were eaten by neighbouring sheep and most of the turutu have not survived, but many others have established nicely.

The planting on the main wetland (Oruawharo Reporepo) has been done by volunteers on an approximately weekly schedule alternating with 'weed busting' since March 2022. The planting is listed in Table 5; 677 trees have been planted so far (excluding those at Oruawharo foot-bridge). The planting reflects species availability on Aotea at the time, rather than species specifically selected for the site.

Table 5. *Plants planted by OME 2020 – 2022 in Oruawharo Reporepo.*
Preferred planting microsites colour coded: orange, drier sites; grey, intermediate, blue, wet sites or close to drains.

Name	**Latin name**	**Number planted**	**Notes**
Mānuka/Kānuka	*Leptospermum scoparium/Kunzea robusta*	195	Some not certainly identified but kānuka on driest sites, mānuka throughout.
Kōwhai	*Sophora microphylla*	19	
Whau	*Entelia arborescens*	5	
Pōhutukawa	*Metrosidertos excelsum*	13	
Karamu	*Coprosma robusta*	50	
Māhoe/whiteywood	*Melicytus ramiflorus*	75	
Kawakawa	*Macropiper excelsum*	20	

Tī Kōuka/ Cabbage tree	*Cordyline australis*	200	
Harakeke/flax	*Phormium tenax*	100 +	
Kahikatea	*Dacrycarpus dacrydioides*	25	Experimental locations. All measured for height
Sedge	*Carex secta*	25	All died, predated by pukeko

Weeding and removal of noxious plants

The weeding has comprised both attacking selected large vigorous weeds mainly at the northern end of the wetland, and releasing previously planted trees from the ubiquitous kikuyu. The selected weeding is summarised in Table 6. By far the biggest weed removal job was carried out by Paradise Landscapes on the main area of pampas. This has opened up the central portion of the wetland, but will require close monitoring as many of the cut 'stumps' will likely regenerate and will need more treatment. Also, there are significant areas of pampas infestations all around the wetland, so, re-invasion from seed will be an on-going problem. The grape vine, a few fruit trees and phoenix palms marked the site of a presumed old orchard on the sandy edge of the wetland. The large casuarina trees along the edge of the Sugarloaf creek were ring-barked by contractors of Auckland Council without consultation with OME. (This was perhaps unfortunate as the main casuarina clump on the creek bend opposite the quarry was a historical pateke flock counting site, which has been monitored annually since 1997 by the Department of Conservation. With the death of the trees and loss of the shady mud bank beneath them, the ducks appear to have moved to a site further upstream).

Table 6. *Selected weeding / tree felling*

Name	**Latin name**	**Notes**
Pampas	*Cortaderia selloana*	Approx 200 large clumps poisoned with glyphosate, many more cut down and subsequently sprayed regrowth. (contractor). Seedlings hand-pulled.
Grape vine	*Vitis vinifera*	Area in N. end cut and pasted and removed from canopy cover and ground
Brush wattle	*Paraserianthes lophantha*	Removed by hand or cut
Lantana	*Lantana camara*	Removed by hand or cut
Mexican devil	*Ageratina adenophora*	Removed by hand.
Phoenix palm	*Phoenix canariensis*	Young plants removed
Cape honeysuckle	*Tecoma capensis*	Poisoned and partially removed by AC Biosecurity Unit
Casuarina	*Casuarina* spp.	Ring-barked by AC Biosecurity Unit

Birds of the wetland

Monitoring program

In 2020 a monthly evening 'walk-through' along the main road causeway from the church to the quarry corner and back was instigated, primarily to count pateke/brown teal and pukeko, but other species were also noted. Although this recording has not been consistent since then, observations made at other times have been incorporated so that a general picture of the bird community and the seasonal changes in abundance or conspicuousness is emerging. In addition, OME have participated each year in the January '5-minute bird counts' organised by the AGBET, with five counting stations along the main road. Also, members of OME have contributed to the Department of Conservation's annual pateke count in late February, counting pateke at the two historic sites (Sugarloaf creek quarry site, Oruawharo creek– Mitchell's site) on three specified dates in each location in each year. Members of OME also contribute to the annual island wide dotterel count, now organised by Auckland Council.

Pāteke

Prior to 2020 the annual pateke counts by DOC indicate a decline at both historic sites. Numbers fluctuated considerably from year to year, but by 2020 the total for the Quarry site was < 20 birds (Fig. 23.).

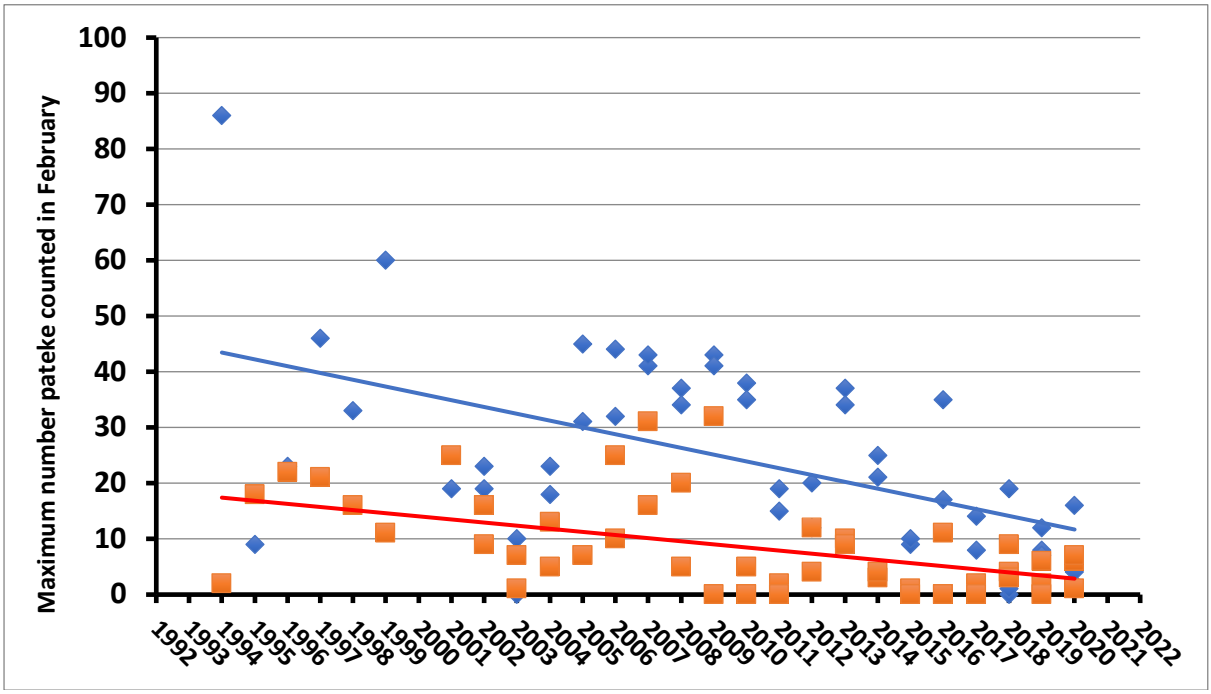


Fig.23. Pāteke decline at Oruawharo/Medlands 1994 – 2020.(Quarry, blue; Mitcheners /Oruawharo, red). Linear trend lines indicated. Data from Department of Conservation.

The 2020 - 2022 February OME/DOC bird counts indicate a total of 22 to 34 pateke at the combined sites [2]. These figures are in broad agreement with the numbers recorded in OME monthly counts at the wetland (Fig. 24): OME's highest single-day count was 35 in June

[2] Oruawharo/Medlands Ecovision: Pāteke counts Oruawharo wetland 2020-2022. Report.

2022. Juveniles have been seen in all months between June and December, with ten on a single day in September 2020. Since the 2021 flood event and death of the Casuarina cover, the 'flocking site' has moved from the Sugarloaf Quarry historical site to a point about 70m further upstream where the original creek intersects the main drain and the northern drain. Eleven to seventeen birds – possibly non-breeders - were often present at this site between May and August 2022, with 35 on one occasion. Pāteke and pukeko numbers follow similar patterns, but the fluctuations are not clearly related to season. There is no evidence that increased pukeko presence diminishes pateke abundance.

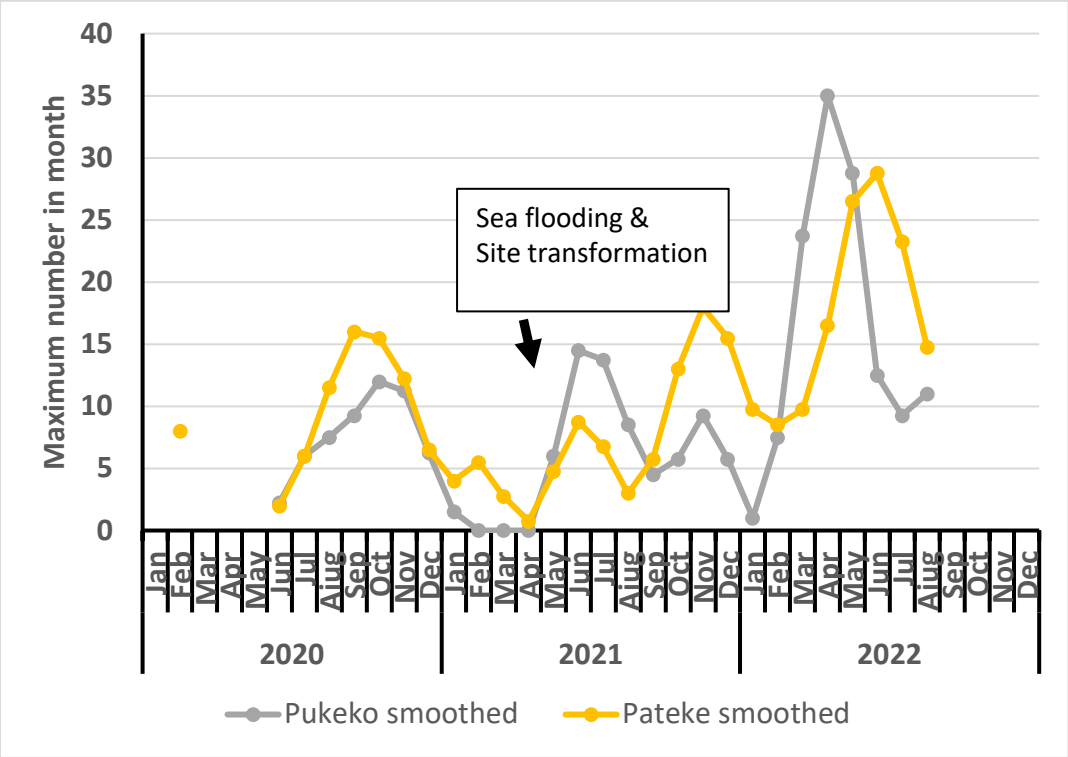


Fig.24. Maximum count of pāteke and pukeko per month on Oruawharo Reporepo (Numbers smoothed over prior and subsequent months, removing extremes)

Matuku hūrepo/Australasian bittern

Bittern is perhaps the most iconic wetland bird species – it is large but extremely cryptic and rarely observed. It is restricted to reedy wetlands for breeding and food supply, and is now highly endangered in New Zealand (and elsewhere). The number of breeding pairs on Aotea has declined with wetland drainage and increased predation pressure; there are now probably < 3 pairs nesting on Aotea. OME has contributed to the bittern database since 2020 by noting observations in the Medlands area (Figs 26 and 27) and to the acoustic bittern survey sponsored by Auckland Council in Spring 2020 (Stewart 2020).

Fig.25. Bittern in the estuary of Oruawharo Creek (Waitematuku), photographed by Briar Martindale in March 2020 in an unusual place, but note that the Maori name for the location means 'the estuary of the bittern'.

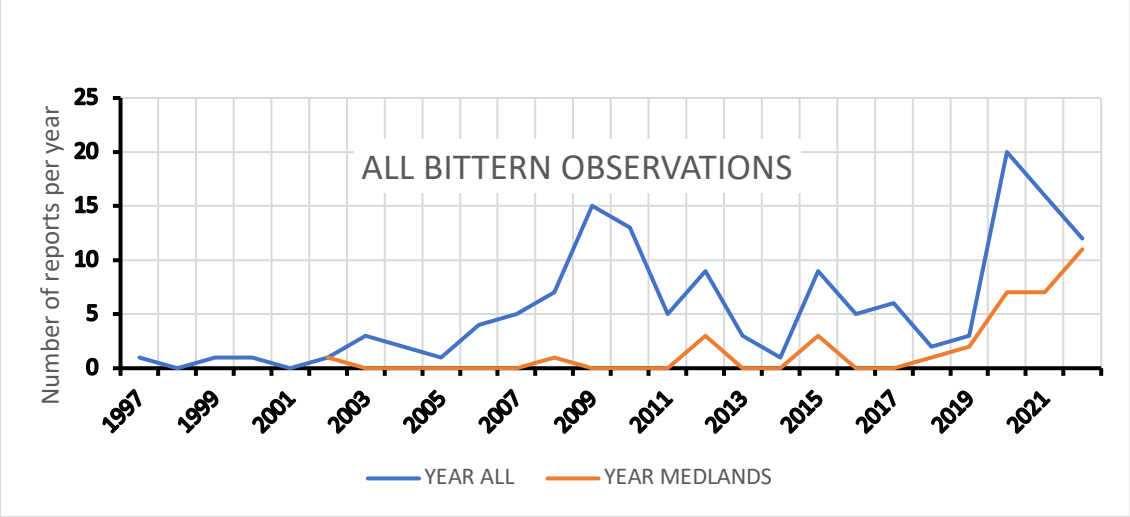


Fig. 26. Bittern observation on Aotea since 1997. Data contributed from many individuals, Department of Conservation, and the Bittern Acoustic Survey (Auckland Council, Paddy Stewart 2020).

Note that fluctuations in Fig. 26 probably represent changes in the number and location of observers rather than in bird abundance; the apparent increase at Medlands since 2019 is probably a reflection of increased observers (OME). There are two 'peaks' of observations during the year (Fig. 27). September – December is the main 'booming' and nesting period, while observations in autumn, March – April, probably represent post-breeding dispersal of juvenile birds, which may land in unknown terrain and appear disorientated. The OME observations appear to represent the latter, rather than birds in permanent (nesting) territories (Fig. 25).

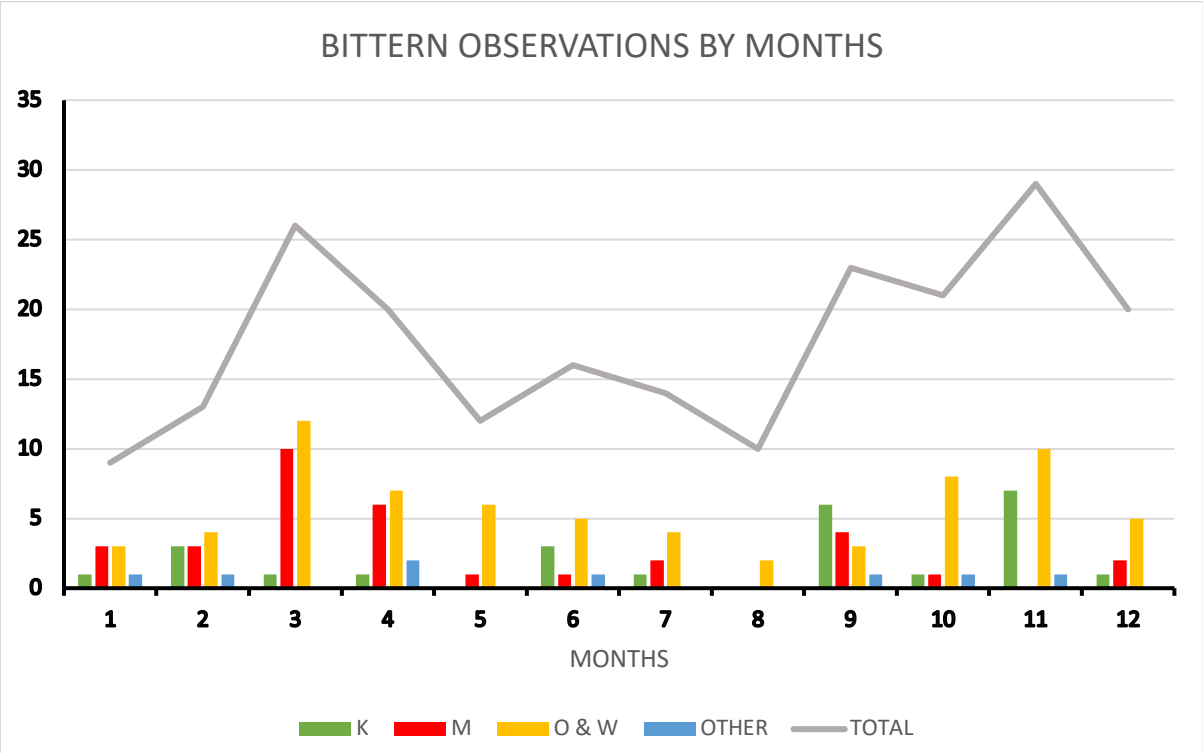


Fig. 27. Cumulative bittern observations by month. K (green) Kaitoke Swamp, Golf Course and Police station swamp; M (red) Medlands area including Oruawharo Reporepo; O & W (yellow) Okiwi and Whangapoua Estuary; Blue, all other observations. The line is the monthly total for all observations.

Other species: the wetland bird community

The Aotea bird counts (2020-2021) indicate that the 'Medlands transect' is one of the richest bird sites (out of 18 recorded) on the Island with 23 or 24 species recorded on the December count days in those years. This probably reflects the diversity of habitats along the transect line, with swamp, scrub, paddock and garden areas all in close proximity, plus a possible lowland coastal influence.

On the wetland ponds and drains there are pāteke, mallard (usually mallard x grey duck hybrids but with a pair of apparently 'pure' parera/ grey duck in 2022), pūtangitangi/paradise shelduck (2 pairs), pūkeko, white faced heron, spur-winged plover and numerous welcome swallows. A black version of the little shag is often present on the main drain. An Australasian harrier patrols the wetland in the winter months. In the scrub swamp area to the north there are pīwakawaka/fantails, riroriro/grey warblers, silvereyes and occasional tūī. Introduced passerines, blackbird, song-thrush, sparrow and finches are all present. Kākā, gulls and oystercatchers fly over occasionally.

Rat trapping and monitoring on the wetlands (compared to dunes)

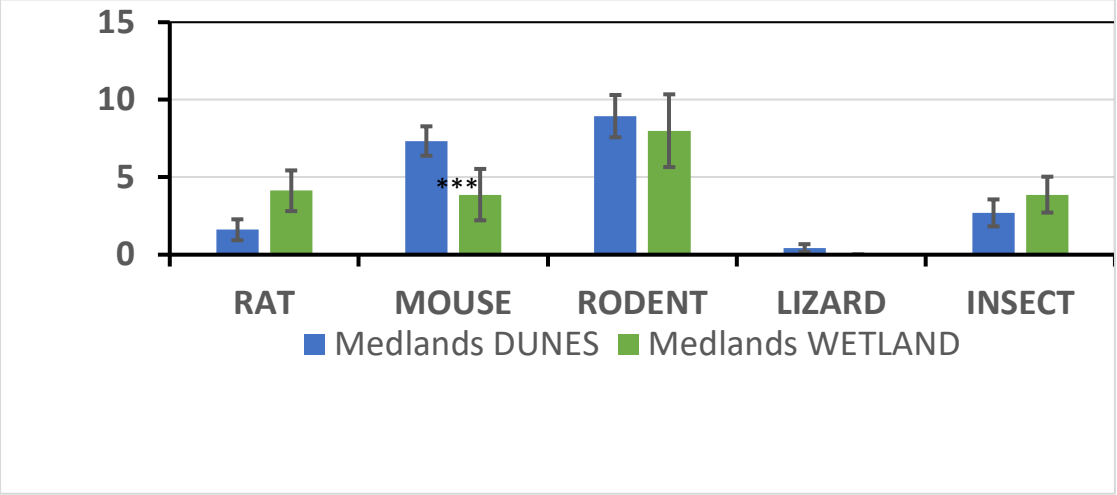


Fig. 28. Tracking tunnel percentages, Medlands dunes compared to Medlands wetlands.

The first rat traps were installed in the wetland in January 2021, and there are now sixty. Excepting the flood and covid breaks, these have been monitored at weekly intervals. Ten tracking tunnels were also installed, and these are compared with the dune results here (Fig. 28). The wetland appears to have more abundant rats and fewer mice than the dunes area. There is no difference in the frequency of large insect prints. No lizard tracks were recorded on the swamp.

CONCLUSIONS

The more understanding we get of the biota in our local ecosystems and the ways pest species exploit them, the more we will be able to conserve (protect and enhance) them. But such endeavours are long-term and must involve community consensus and action. In their first three years of operation the Oruawharo/Medlands Ecovision group have made conservation advances in the following areas:

- developed working relationships between the group and its main funding agencies, in particular the Department of Conservation and Auckland Council
- evolved a working committee structure with finances under the Aotea Great Barrier Environmental Trust as the umbrella organisation
- worked with other conservations groups on Aotea to extend the cat-free and rat-free aspiration from Medlands to the Windy Hill Sanctuary (Phase 2)
- engaged many local residents, the wider Aotea community and visitors, in conservation discussions and actions
- involved local school children in conservation
- achieved better protection of New Zealand dotterel and variable oystercatcher on Medlands beach
- listed the birds present in the Medlands area
- removed c. 4000 rats and mice, predominantly from the Medlands dunes
- obtained information from tracking tunnels which have enabled a preliminary hypothesis that *mice* are the predominant predators of large insects and lizards on the dunes
- indicated that the off-beach islets have biodiversity value which should be recognised
- carried out a vegetation survey of the Oruawharo wetland and emphasised its historical significance and recent natural disturbances
- removed significant weeds from Oruawharo wetland (especially Pampas)
- planted over 700 native plants from 11 species in and around the wetland
- advocated for greater access to the wetland, with paths, bridges and look-outs
- advocated for the removal of feral pigs from the Oruawharo/Medlands ecosystems
- obtained data on the birds of the Wetland, especially pāteke and matuku hūrepo makutu/australasian bittern
- advocated successfully for a picnic bench in the council reserve by Waitematuku overlooking Boatshed Rock and encouraging the public to stop and look at birds in the estuary. Signs with information on the birds are to follow.

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All photos in this report were taken by Lotte McIntyre or John Ogden unless otherwise specified.

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