

Ark in the Park

Pest Control and Biodiversity Outcomes 2008-2010



Photo: Eric Wilson

Report to ARC Prepared by Dr Maj De Poorter, *Ark in the Park* Project Manager
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Auckland
Regional Council
TE RAUHĪTANGA TAIAO



1. Introduction

The *Ark in the Park* is an open sanctuary at the Cascade Kauri in the Waitakere Ranges Regional Park, close to Auckland City. The project started in January 2003 and the aim is to restore functioning native ecosystems through pest control and re-introduction of native animals and plants lost from the Waitakere Ranges. This community based project is a partnership between Forest & Bird (Waitakere Branch) and the Auckland Regional Council.

The *Ark in the Park* area, as at July 2010, is 1750 ha, with an additional 600ha of pest control on neighboring private properties (the Buffer Zone). Unlike many other “mainland island” projects, *Ark in the Park* does not have a predator proof perimeter fence – instead, ongoing pest control by our volunteers keeps predator numbers low enough to allow survival and breeding of re-introduced as well as original native birds and other biodiversity. Main predators targeted are ship rat (*Rattus rattus*) and other rodents, mustelids (stoat, ferret, weasel) possums and feral cats. Some weed control is also included. The success of the project has lead the Department of Conservation (DOC) to approve the re-introduction of popokatea (whitehead), toutouwai (North Island robin), and hihi (stitchbird). Most recently, re-introduction of North Island kokako to the *Ark in the Park* was approved by the Kokako Recovery Group (which is led by DOC) and 8 birds have already been released.

Community support is reflected in the number of volunteers and volunteer hours made available to the project. Over the year 2009-10, volunteers have put in an estimated 8000 hours of work, roughly divided as: 3000 servicing baitstations and stoat traps, 2500 of monitoring re-introduced birds, 750 of support for kokako catching, 500 of rodent monitoring and at least 300 on various projects including assisting with canopy studies, invertebrate monitoring and lizard monitoring, as well as 250 hours on governance and various other tasks.

This report highlights the key achievements over the 2008-2010 period. A report on achievements against the *Ark in the Park Annual Work Programme 1 July 2009-30 June 2010* is also attached.

2. Finalisation of *Ark in the Park* Restoration Plan

The *Ark in the Park* Restoration Plan¹ was finalised during the 2009-10 year. It had been developed jointly by Forest & Bird and the Auckland Regional Council (ARC) over several years, including several drafts, discussion within the *Ark in the Park* Governance Group², the ARC Parks and Heritage Committee, extensive stakeholder consultation, discussion with ARC Heritage and Biosecurity teams, Forest & Bird, and the Technical Advisory Group³. The restoration plan outlines the proposed restoration strategy for the next 5 years along with a vision for the future. A reviewed version will be prepared in 2013. It provides an integrated framework for restoring natural heritage, ecological processes and indigenous species in the project area. It integrates policies and actions from the Auckland Regional Council's Regional Parks Management Plan (2004) and the former *Ark in the Park* – Strategic Plan for an Open Sanctuary (2002).

The *Ark in the Park* Restoration Plan sets out the project's vision and goals:

Vision: *to enhance the biodiversity and ecosystem function in the Ark area to a state similar to that prior to logging and farming.*

By doing so, the project aims to showcase how ecological values can be protected and enhanced through community involvement and interagency co-operation and commitment.

Goals:

- *To enhance the biodiversity of the area by translocating and reintroducing flora and fauna species*
- *To create self-sustaining populations through biodiversity and intensive pest control*
- *To encourage community and inter-agency involvement*
- *To restore the dawn chorus for future generations*
- *To promote research on ecosystem recovery*
- *To expand the predator-control area*

¹ Bellingham M., Jack S., Makan T., Sumich J. and de Poorter M. (2009). *Ark in the Park Restoration Plan 2009*; Published by the Royal Forest and Bird Protection Society, Auckland, 2009.57pp.
At: http://www.arkinthePark.org.nz/about_ark_in_the_park/progress_and_plans.html

² The *Ark in the Park* Governance Group, covered in the *Ark in the Park* Memorandum of Understanding, is made up of at least two representatives from the Auckland Regional Council and two from the Waitakere Branch of Forest and Bird. The group helps guide the strategic direction of the project.

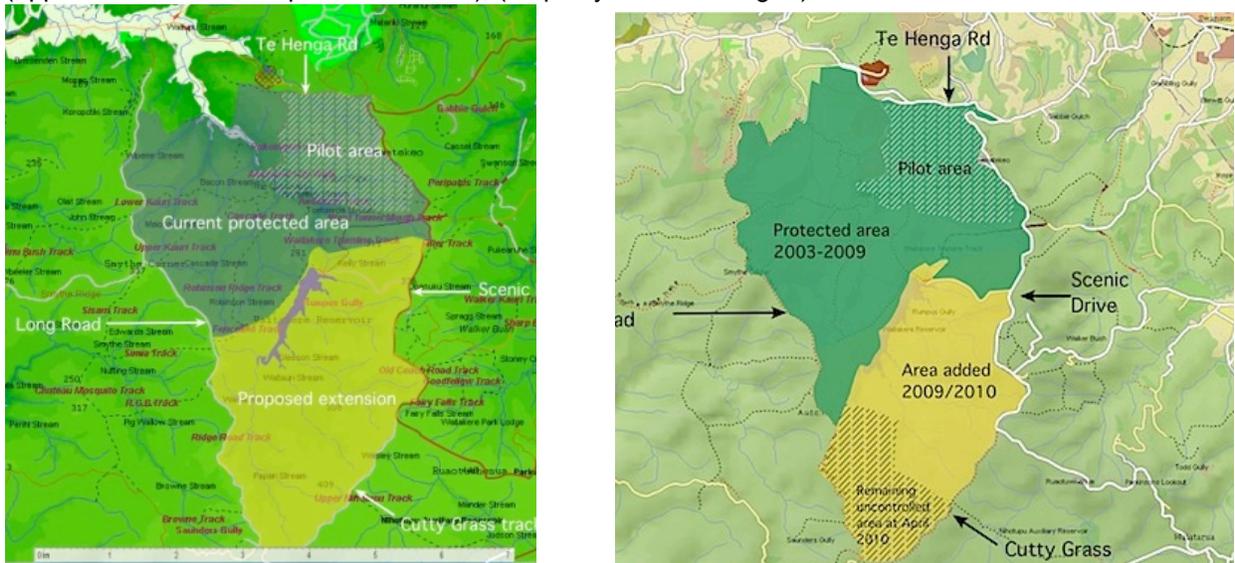
³ The *Ark in the Park*'s Technical Advisory Group (TAG) meets twice per year and is made up of representatives from Forest and Bird and the ARC, along with technical expertise from the ARC's Heritage and Biosecurity teams, Forest and Bird, Auckland and Massey Universities, Department of Conservation and other experts as required.

3. Acceleration of planned expansion

The *Ark in the Park* area as at 1 July 2008 was 1100 ha. The Restoration Plan included the planned expansion of the *Ark in the Park* to a 2000ha area by 2013, and consequently approximately 100ha was added in the 2008-09 season. This phase had to be accelerated when the post-release monitoring of the kokako showed that by November 2009 they had started to settle SE of the Waitakere Dam area. This location was outside the 2009 pest management borders, but in the planned expansion area. This quick response was possible through a cooperative approach, with a new block being added as part of a bait-effectiveness study as a Massey University Masters Thesis (see also below). ARC-Biosecurity provided funding, in kind time was contributed by ARC's Western Parks, hardware and contractor time was funded from Forest & Bird's *Ark in the Park* financial reserves, and in kind volunteer time was also provided by Forest & Bird. This was followed by another block in early 2010, bringing the pest controlled area up to a total of 1750 ha.

Given the range of movement of kokako, and the planned additional translocations of up to 22 more birds over this season and the next, intensive pest control needs to be expanded as soon as possible into another 250 ha block to reach the originally anticipated 2000 ha and provide better protection for the kokako and their likely nest sites. This work has been initiated in April 2010, again with financial support from ARC-biosecurity, with the aim of testing an alternative bait rather than Brodifacoum. It is hoped that it will be possible to finalise this before the 2010-11 kokako breeding season starts.

Fig.1 *Ark in the Park*; Left: as of 1 July 2008 (1100 ha under predator control); Right: as of April 2010 (approx. 1750 ha under predator control); (Maps by Maurice Colgan)



4. Biodiversity outcomes: Reintroduced species

4.1 Kokako

Kokako were present in the Waitakere Ranges until the late 1950s. The reintroduction of kokako into the *Ark in the Park* is part of their national recovery plan, aiming to create a new self-sustaining population



Photo courtesy of ARC

The first kokako release event on 8 September 2009 was very successful with a large turn out of public and great support from the donor-iwi Rereahu and Pouakani who travelled up from the Maniopotu, and receiving iwi Kawerau a Maki who welcomed them. Media coverage was very satisfactory including on TV3 news, National radio, Radio Live, Scoop Pacific, and many local newspapers. The planning and lead up to the event was done in a full and effective partnership approach between ARC and F&B at all operational levels.

Six kokako were released in September and November 2009: 4 females and 2 males from Waipapa (Pureora Forest). The kokako were all fitted with radio transmitters, and monitored by radio telemetry until April 2010. Volunteer response to help with this task was overwhelming – especially in view of the fact that during the first month the daily telemetry sessions had to take place at dawn at 4.30 am every morning with suitable weather. The sound anchoring was done as part of a PhD study by David Bradley (Waikato University).

Initially, several of the birds moved around considerably inside and outside the *Ark*. Because the most likely first nesting pair – a male and female that remained consistently in each other's proximity – were regularly tracked in an area South East of the Waitakere Reservoir, it was decided to accelerate the planned *Ark expansion* (see above). By April 2010, all six birds were located by radio telemetry in the new expansion blocks. Since then, transmission has stopped, but automated sound recordings indicate that kokako are still present in that area (Fig 2)

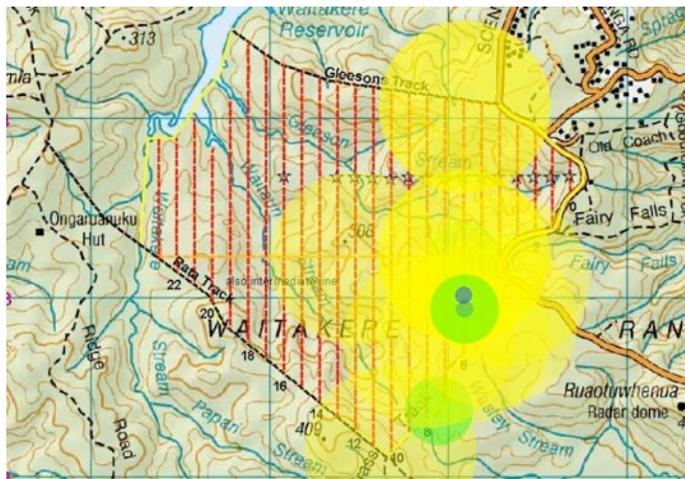


Fig 2 Area where sound recording has picked up the presence of kokako. The circles represent areas where the recorded kokako may have been likely (yellow) or very likely (green) at the time of recording. (Map by Eric Wilson).

The kokako Recovery Group considers ten pairs to be required to have a good probability to establish a new population. The aim was therefore to capture, 10 pair (=20 birds) of North Island kokako in the Waipapa and Mangatutu Ecological Areas of Pureora Forest Park (Waikato DOC Conservancy) for transfer to *Ark in the Park* in the 2009-10 season. However, significant difficulty was experienced capturing kokako due to unexpected lack of response by

the birds to the normal catching methods, and adverse weather. As a result, the two expert catching teams, led by Paul Jansen, only obtained seven kokako (6 of which were released) over 40 days of catching attempts.

The Kokako Recovery Group is very supportive of our efforts so far, and as a result of a brainstorming session on the low catch numbers, it recommended that DOC amends our catching permit to facilitate access to more “donor” areas in 2010, including Mapara and Tiritiri Matangi. Hazel Speed and Oliver Overdijk from the Kokako Recovery Group have been providing ongoing advise and we will continue to work closely with them.

On 29 May 2010, one female and one male from Tiritiri Matangi were released in the *Ark in the Park* area, in a cooperation between the *Ark in the Park* partners, DOC, Supporters of Tiritiri Matangi, Ngati Manuhiri and Kawerau a Maki. Initially the birds separated, but after a few weeks, both birds appeared to have settled in the area close to the Golf Course and the Auckland City Walk. The male and female are together and have been observed and photographed several times. There are now 8 kokako in the *Ark in the Park* and we are hopeful there will be at least 3 successful nests this season.

A much bigger effort will be required to catch kokako in the second half of 2010, compared to originally planned.

4.2 North Island Robin (toutouwai)

Fifty-three robins (toutouwai) were initially re-introduced into the *Ark* in April 2005, from Mokoia Island, near Rotorua. After a decline in Robin numbers in 2008-09, which was thought to be in part caused by predation by feral cats, a top-up translocation of 30 birds took place in June 2009, from Mangatutu (Waikato). This supplementary translocation was appropriate as establishing a self-sustaining population in a mainland setting is more likely with additional individuals. North Island Robins, although not a threatened species, have a contracting range and our re-introduction will increase the prospect of establishing them to a part of their previous range. Management targeting feral cats has been intensified.

Fate of the birds translocated in 2009: Between June 2009 – AND April 2010, 17 individuals of the 30 translocated from Mangatutu were observed. A total of 304 sightings of Mangatutu birds were recorded during this period. Ten of the 30 Mangatutu birds have participated in breeding in the first year following their release, while a further Mangatutu bird was seen engaged in courtship (being fed by a male) but not observed breeding. In comparison, of individuals initially released in 2005, also 10 birds (5 pairs) were observed breeding in their first year (2005-2006), but the number of birds released had been larger (53 then vs. 30 in 2009).

Summary breeding data are shown in Table 1. This is based on last season’s observations as well as the work carried out by one of the overseas volunteers in 2008-09.⁴

⁴ Leenen M. (2009) *Population study of the North Island Robin (Petroica australis longipes) in the Waitakere ranges in New Zealand.* - A report of the methods and materials used to monitor the reintroduced North Island Robin population in the Waitakere Ranges Regional Park including a comparison of previous breeding seasons and a discussion of current conservation activities.

At: http://www.arkinthepark.org.nz/downloads/population_study_of_the_nor.pdf

Table 1 Robin Breeding Season Summary Data 2005-2010

Breeding Season	No. of breeding pairs	No. of found nests	No. of chicks	No. of banded chicks
2005/2006	5	11	24	14
2006/2007	6	13	25	17
2007/2008	8	15	24	11
2008/2009	5	10	13	12
2009/2010	9	14	18	8

We conclude that the combination of the top-up translocation and better management of feral cats has had the desired results:

- the number of breeding pairs in 2009-10 was higher than in any other year
- the proportion of 2009 translocated birds breeding was almost double
- robins are more widespread (fig3).

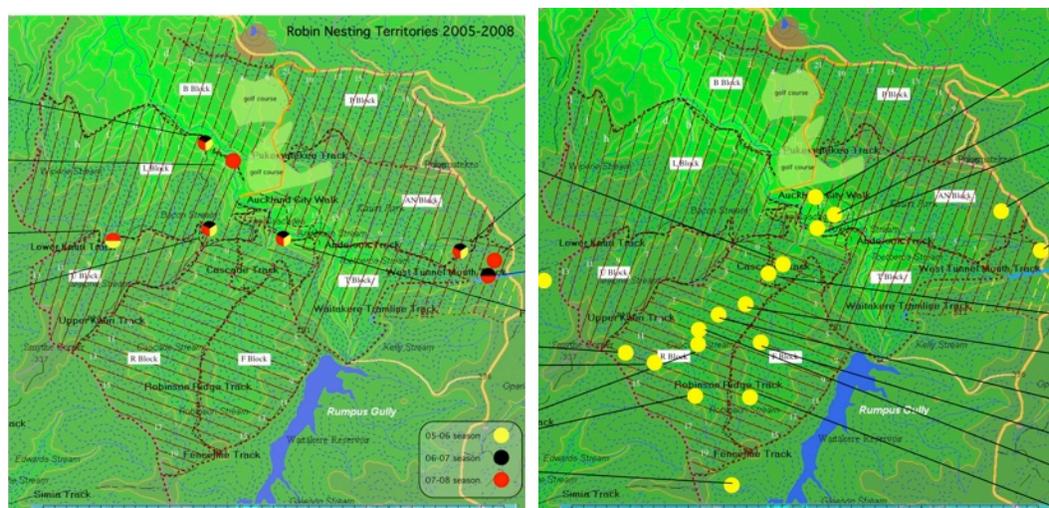


Fig 3. Left: North Island robin territories identified in the seasons 2005-06, 2006-07 and 2007-08; Right: locations of Robin observations in 2009-10. (Maps: Maurice Colgan)

The expected dispersal has generated sightings in other parts of the Waitakere ranges, outside *Ark in the Park*, with both banded and unbanded birds being reported by the general public, ARC staff and *Ark in the Park* volunteers. Some of these sightings have come from nearby areas of predator management.

Robins are regularly seen by visitors, even by those that have no great knowledge of birds. This species plays an important “ambassador” role fostering understanding of the concept of ecosystem restoration.

4.3 Whitehead (popokatea)

Fifty-five whitehead (popokatea) were introduced in August 2004, with a top up of 50 in April 2008 from Tiritiri Matangi. They are relatively inconspicuous canopy dwellers and harder to observe, but their presence is regularly confirmed – be it in relatively low density due to their dispersal over large areas of the Waitakere Ranges outside the *Ark* itself. As numbers increase, these birds should hopefully become more conspicuous.

Recent discussions with the Department of Conservation (DOC) resulted in its support for the development of a strategic long term approach (5 to 10 years of regular translocations) to contribute to the re-introduction of this species to *Ark in the Park* and the Waitakere Ranges. It is anticipated that the first translocation in that context will take place in 2011.



Photo: Andy Warneford

4.4 Hihi (stitchbirds)

The hihi or stitchbird is one of New Zealand's rarest birds. Following habitat loss, overzealous collecting, the introduction of new predators and disease, they were eradicated from the mainland, surviving only on Hauturu (little Barrier Island). In 2007, fifty-nine hihi were re-introduced into *Ark in the Park* from Tiritiri Matangi Island,

and another 51 in May 2008.

In the 2008-09 season, 13 nesting attempts were estimated (11 observed). At least 25 fledglings were produced. Two males from the 2007 release successfully nested, as well as several individuals from the 2008 release. An unbanded adult female was observed feeding chicks in December 2008 – leading to the conclusion that she was an “Ark-born” female from the season before. Hihi did not use the nest boxes that had been provided for them, but instead all nests that were observed were in natural cavities in kauri.

In the 2009-10 season monitoring detected very low numbers in the core area with 5 adult males and one adult female. In addition, one pair of hihi can be considered as confirmed to the SW outside the *Ark* area and reports (not confirmed) also suggest hihi presence to the NE (outside *Ark*) and in the 2009-10 *Ark* extension. No nesting was observed, but in early April 2010 an unbanded bird was sighted in the *Ark* core area which is thought to be a juvenile from this season (due to plumage). This could indicate that at least some undetected breeding had taken place.

Discussion: The low numbers are likely due to a combination of: stochasticity associated with low numbers; higher rat numbers than usual due to rich food supply; female exhaustion high feral cat numbers in the 2008-09 season and dispersal out of the core area.

Because of the good natural food supply and natural nest cavities, *Ark in the Park* is a likely habitat where hihi could be self sustaining if a population can be established at sufficient numbers. In May 2010 the Hihi Recovery Group (led by DOC) restated the desirability for attempting the re-introduction of hihi into the *Ark in the Park*, but also decided against further

top-up translocations at this stage, and to revisit this when more is known about hihi natural dispersal. The reintroduction of hihi to the *Ark in the Park* was always known to have an experimental element to it – the *Ark* being the only mainland site with hihi where a predator controlled site is surrounded by non-controlled contiguous habitat that may act to “lure” hihi away. As such the *Ark* is a significant testing site for the overall national efforts under the guidance of the Hihi Recovery Group.

5. Biodiversity Outcomes: Original native bird species-monitoring

John Staniland (Chair of Waitakere Branch of Forest & Bird and member of the Ornithological Society) carries out ongoing monitoring of birds on a specific track circuit on one “control” circuit in an area in the Ranges where no pest control is being carried out, except possum control carried out across the Ranges by the Auckland Regional Council’s Biosecurity staff. The two areas are generally but not exactly similar in forest type, altitude and circuit length, and both counts are each carried out in spring, summer and autumn at the same time of day and in similar good weather.

The graphs for tomtit, tui and fantail (Fig 4) confirm our prediction that populations of original native bird species that were already in the *Ark* area would, in general, benefit from the increased and year round predator control

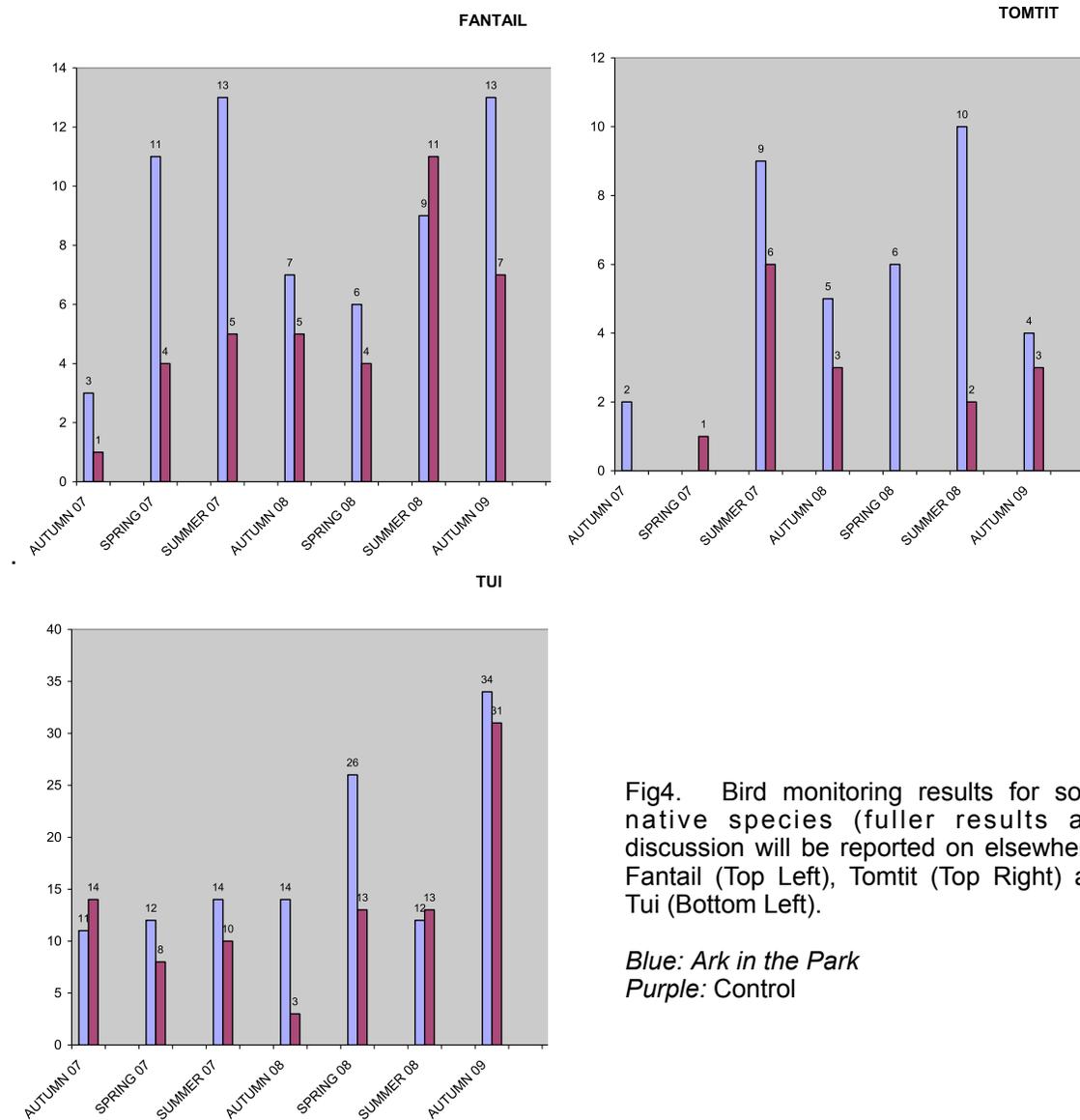


Fig4. Bird monitoring results for some native species (fuller results and discussion will be reported on elsewhere): Fantail (Top Left), Tomtit (Top Right) and Tui (Bottom Left).

Blue: Ark in the Park
Purple: Control

6. Pest management

Unlike many other “mainland island” projects, *Ark in the Park* does not have a predator proof perimeter fence and hence is under continuous pressure of re- pest species, requiring ongoing pest control by our volunteers to keep predator numbers low enough to allow survival and breeding of re-introduced as well as original native birds and other biodiversity.

The main predators targeted are ship rat (*Rattus rattus*) and other rodents, mustelids (stoat, ferret, weasel) possums and feral cats. Some weed control is also included. Pig control is carried out by ARC. . The Waitakere Ranges are free of deer and goats.

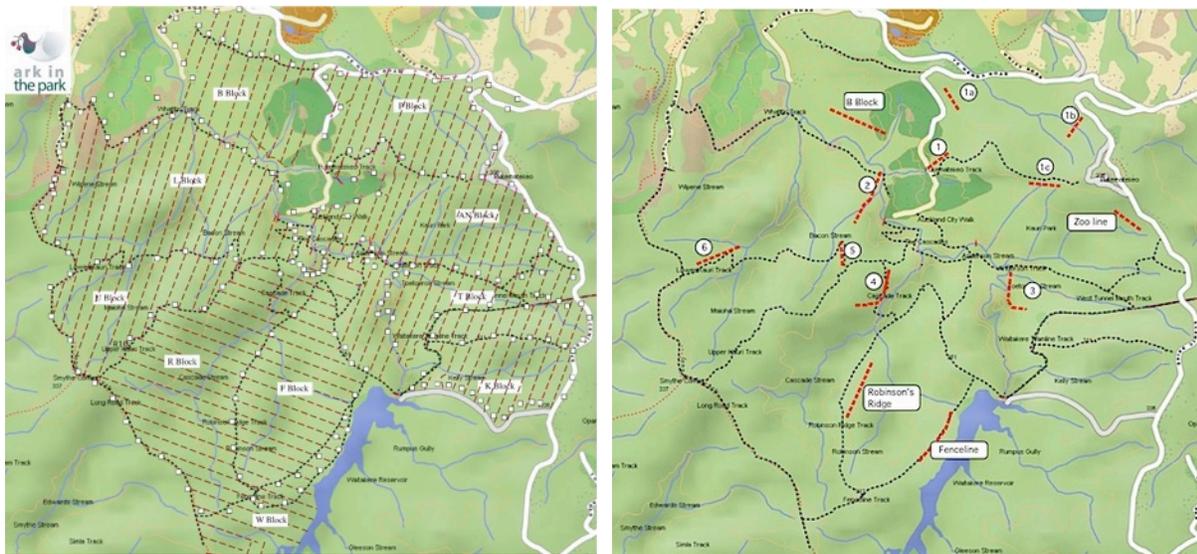


Fig5. Left: Rodent Control bait lines (-----) and stoat traps □ as of June 2009. Right: Rodent Monitoring lines (Feb 2008). (Maps: Maurice Colgan)

6.1 Rodents: bait lines

Rodent management centres on “year-round” availability of Brodifacoum baits (“Pest Off”) in Philproof bait stations on gridlines spaced at 100 x 50m (see Fig5). Bait, provided by ARC, is contained in 150g doses in sealed plastic bags, keeping bait fresh for longer. The project’s aim is to reduce rat numbers to under a 5 % index over the period September to February (the breeding season of many of our native species). Comparable, unmanaged areas in the Waitakere Ranges typically have a much higher rat tracking index, with most readings above 40% and up to 80% for rats (see Fig. 7).

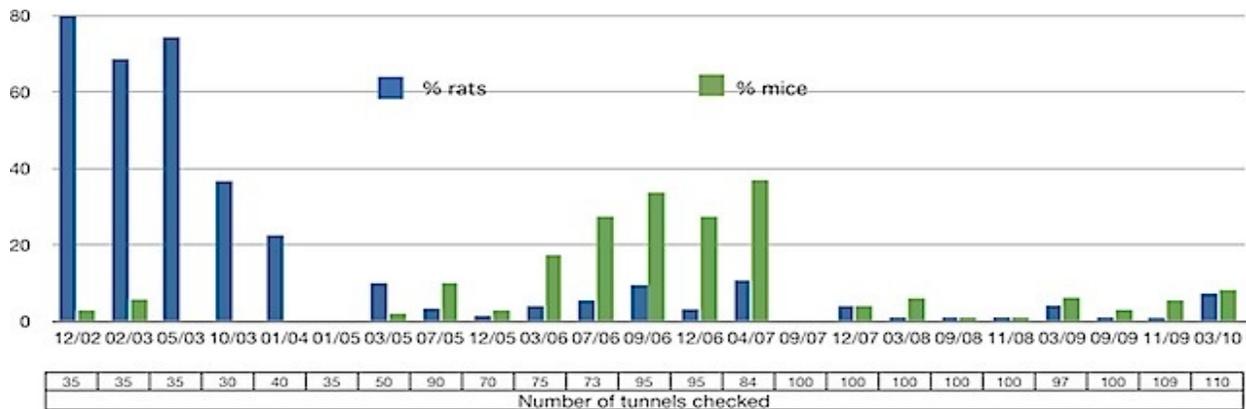
Bait uptake estimates at each bait station are recorded. Bait uptake information for several years has been analysed to further guide adaptive management. This study showed that ‘hotspots’ of pest presence can be identified with this basic method, and in future we can hence respond to such hotspots promptly (see case study below).

We continue to evaluate existing and new methods, baits and technologies in order to minimise the use of toxins, while maintaining effective and efficient protection against pests. One such minimisation trial was part of our 2008-10 achievements (see below).

6.2 Rodents: monitoring results

Tracking tunnels are used to monitor rodent numbers, following standard DOC protocols. The area and location of tunnels is shown in fig 5. Additional tracking tunnels are used as a control in areas without pest management.

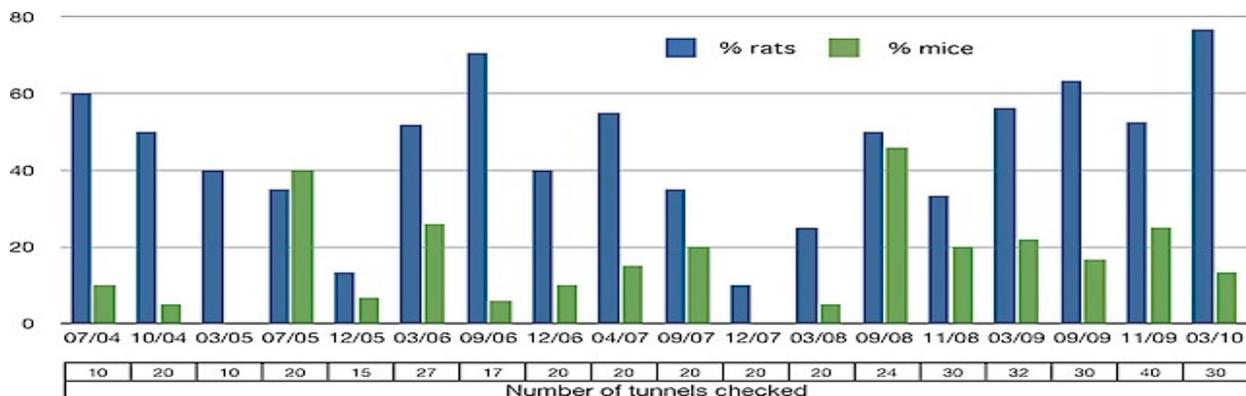
Fig 6. Results of rodent monitoring in the pest management area (as in Fig 5)



Predator control started early in 2003 in 250ha of the Cascades Park. Since then, the reduction in rat numbers has been spectacular. There was an initial increase in mouse numbers, almost certainly due to the absence of rats, but since 2007 mouse numbers have also dropped - this was achieved by intentionally making it easier for mice to access the bait stations (Fig 6).

The results show that *Ark in the Park* is achieving its aim is to reduce rat numbers to below 5 % index over the period September to February.

Fig7 Results of rodent monitoring in the control area without pest management



The variability of the rodent numbers can be explained in terms of the normal cycle of rodent populations and food availability.

Management and predator control in a 'Mainland Island' ecosystem : Assessment of rodent control efficiency

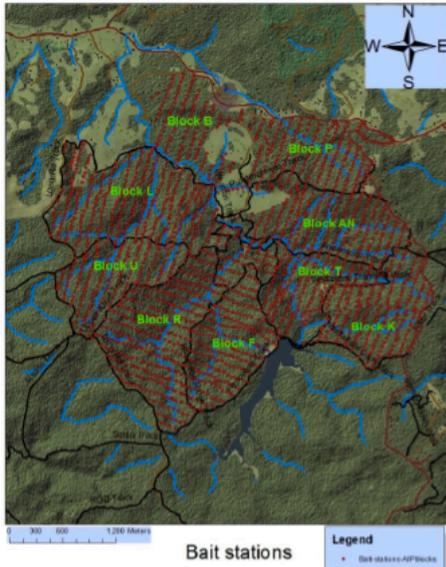
Adrien Martineau
University Paul-Cezanne
Aix-Marseille

Internship at Royal Forest and Bird Society of New Zealand



The aim of the Ark in the Park Open Sanctuary is to restore sustainable mainland populations of endemic New Zealand species through intensive pest control. The main targets are rats, possums and mustelids. The purpose of this report was to assess the efficiency of the rodent control and to better understand how predator control techniques have been working.

Since the beginning of the project in 2003, a grid of rodent bait stations was set over the area of Ark in the Park. When the bait stations are rebaited every six months, volunteers record how much bait has been eaten at every station. This data has been linked with the location of the bait stations in order to assess rodent control efficiency. Predator control at the Ark in the Park sanctuary has shown to be very effective. This study shows that 'hotspots' of pest presence can easily be identified with basic monitoring methods, and therefore make rodent control in Ark in the Park more efficient and effective.



Rodent bait station recording card

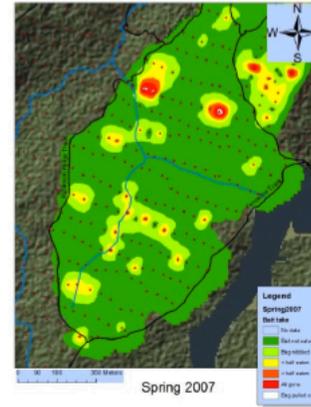
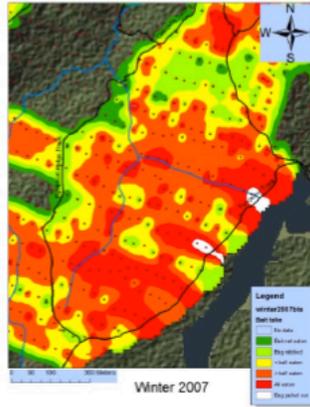
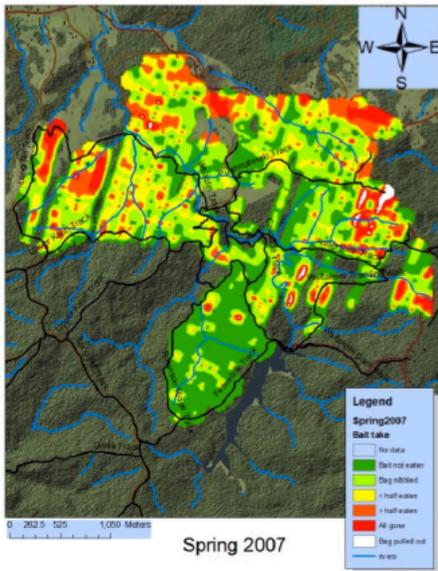
Station	Bait not eaten	Bag nibbled	% gone	Date	Name	Category
1	✓					1
2	✓					1
3			✓			3
4		✓				2
5					✓	6
6				✓		4
7				✓	✓	5
8				✓		4
9		✓				2
10	✓					1

Key Results

- All bait taken in first baiting season
- More bait take in stations near the boundaries of Ark in the Park
- Some 'hot spots' of bait take in the interior



- Analysis of 2200 bait stations over 1100 hectares
- Sorted by seasons, and by year.
- In total, more than 11000 data entries since 2006



- F Block first baited in Winter 2007
- Second baiting Spring 2007

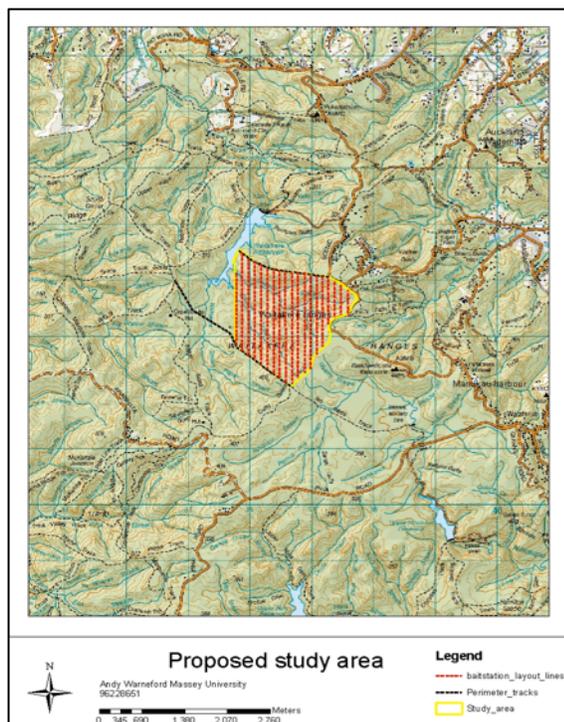
Ark in the Park now has the capacity to detect rat 'hot spots' within a week of baiting and to respond to with more monitoring or a change in control methods (different bait, bait station spacing or trapping).

Note: Blank areas are where data has either been lost or not collected



A special thanks to Eagle Technology for supplying ESRI's ARCGIS to Forest & Bird

6.3 Rodents: Bait optimisation study – preliminary results⁵



As explained above, part of the accelerated expansion of the *Ark in the Park* area towards the intended size of 2000 ha was carried out as a Msc project by Andy Warneford (Massey University). The aim of the research is to test effectiveness of a 100m x 100m grid for bait stations in comparison to the 100m x 50m grid used originally. The overall context for this is the desirability to reduce the amount of Brodifacoum used to the minimum possible while retaining effective protection. ARC-Biosecurity provided funding, in kind time was contributed by ARC's Western Parks, hardware and contractor time was funded from Forest & Bird's *Ark in the Park* financial reserves, and in kind volunteer time was also provided by Forest & Bird. The area in question is approximately 287ha. And the research started in November 2009. At the termination of the research, the area will be further managed as an integral part of *Ark in the Park*. As of August 2010, one initial baiting and two re-baitings have been carried out.

Preliminary results:

- Pre-baiting monitoring: 60-90% rodent presence in managed block and 50% rodent presence in control (= non pest managed area)
- Post-baiting monitoring: 3% average (0% in centre – 10% in periphery) in the managed block and 60-90% in the control (= non pest managed area)
- This result is hence very promising
- Msc thesis completion expected September 2010

6.4 Mustelids

Mustelid control is achieved with the use of either Fenn or DOC 200 traps enclosed within tunnels. Traps are placed at approximately 200 m spacings along the existing ARC track network to facilitate the frequent checking/clearing required. The project aims to have the managed area encircled by traps at all times, with additional trap lines running through the interior. Maintenance of traps is responsive to seasonal flushes in mustelids numbers i.e. more frequently checked in summer and warmer periods. These traps also occasionally catch rats or hedgehogs (Fig 8)

For 2008-09 the numbers caught were: 67 stoats, 5 weasels, 5 ferrets, 15 hedgehogs

⁵ Andy Warneford Msc thesis, Massey University, 2010 (in preparation)

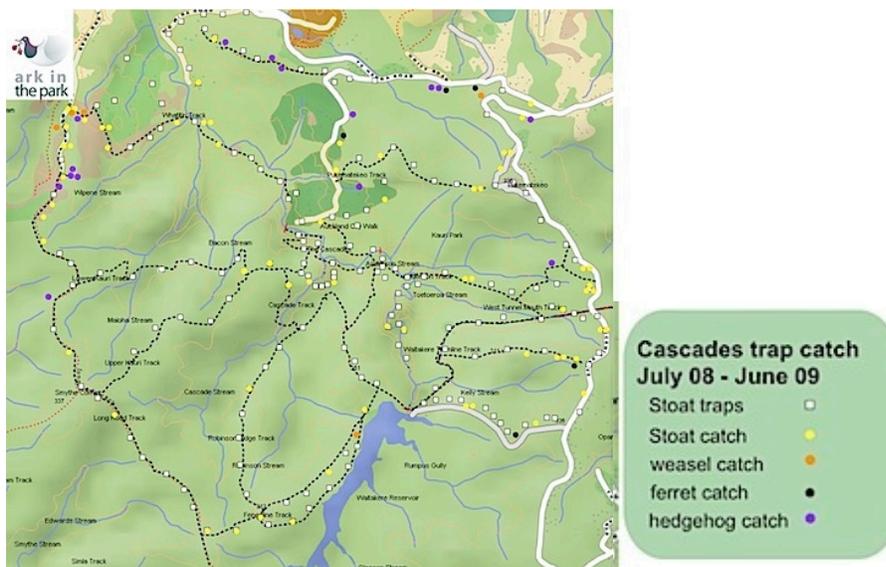


Fig 8 Trap catch July 08-June 09 (Maps: Maurice Colgan)

6.5 Kauri dieback - *Phytophthora taxon Agathis*

Kauri dieback is caused by a pathogen (a disease-causing agent) known as *Phytophthora taxon Agathis* (PTA). Until April 2008 it had not been identified as a new species, nor was it known that PTA killed kauri. Symptoms include yellowing of foliage, canopy thinning, dead branches and tree death. Affected trees can also develop lesions that bleed resin. It kills kauri of all ages and sizes. The disease has been found in the Waitakere Ranges and is under observation at Cascade Kauri, Karekare, Anawhata and Huia.

PTA is believed to be a soil-borne species spread by soil and soil water movement, plant to plant transmission through underground root-to-root contact, and human and animal vectors. There are significant information gaps about the disease, its vectors and management options. ARC is funding initial research including a delimitation survey of where the disease is present in the Auckland region, its vectors of spread, and preliminary work on control of the disease.

ARC has developed an operating procedure for its staff and contractors working in kauri forest and Forest & Bird consider PTA a significant threat to our native biodiversity. *Ark in the Park* volunteers and contractors strictly adhere to all ARC requirements and operating procedures, and regular cleaning with Trigene has been incorporated as “normal practice”.

6.6 Various other pests

ARC intensified its pig management in the 2009-10 season, in view of the risk that this species poses for vector for PTA as well as having impacts on other native biodiversity. Management of targeting feral cats was also intensified by the *Ark in the Park* project, after the 2008-09 season showed disappointing breeding results for robins. Since then robin seems to have improved.

The *Ark in the Park* project area benefits from the initial ARC Operation Forest Save possum control programme carried out from 1997 to 1999. Follow-up control is now carried out in targeted areas throughout the Ranges by the ARC. ARC’s monitoring indicates that currently

possum levels are very low in the *Ark in the Park* project area and this is being maintained by the project's bait control programme.

Dog control is an on-going problem as not all visitors to the area comply with the 'dogs on a lead' policy. Especially robins are likely to be at risk from this. Signs/interpretation are important tools and *Ark in the Park* is currently using these to help educate dog owners of the importance of controlling their animal.

Work continued to reduce the rabbit population near the golf course. Although no targeted control is carried out, hedgehogs are regularly caught in mustelid traps on or adjacent to grassed areas.

7. Ark in the Park Buffer Zone

The Buffer Zone includes an additional 600ha of pest control on of neighbouring private properties. Pest management hardware for Buffer Zone participants has been supplied by Forest & Bird and bait has been supplied by the ARC, pre-bagged by Ark volunteers. Forest & Bird obtained funding for a part time field officer to coordinate Buffer Zone activities and encourage and advise landowners. Such coordination makes a significant difference through the provision of prompt advice to individual queries and through keeping up participant's motivation, avoiding attrition

In December 2009/January 2010 one of the newly introduced kokako from the Ark moved to Matuku Reserve and then moved back to the Ark within a few weeks (fig 9). This illustrates that the pest control in the Buffer Zone has already been of use to the budding kokako population by providing protection when they venture outside the Ark itself. Continued participation from neighbours in the Ark in the Park's Buffer Zone is required.

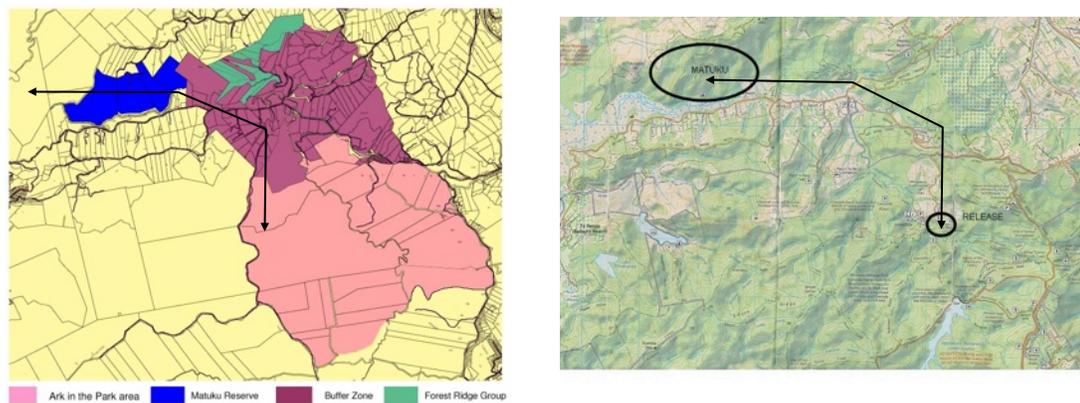


Fig 9. Estimated movement of kokako female No 45 between Ark in the Park and Matuku Reserve and back to the Ark, Dec 09 –Jan 10. Left: Buffer Zone location (Note: Forest Ridge is part of the overall Ark Buffer Zone). Right: Topographic view of same. The estimated movement was more than 6 km one way.

8. Some New research and/or monitoring developments for 2010-2011



Photo: John Sumich

Canopy studies: two planned post-graduate studies: a rata pollination study, and a kauri epiphyte study to be undertaken by an MSc and a PhD student from the University of Auckland, respectively, will be the first studies in the canopy. The students will need support crew equally trained in climbing techniques as a safety measure and one or more studies will be undertaken by the *Ark* climbers as an objective during skills maintenance. Surveys for arboreal lizards and monitoring for rodents in the canopy are currently planned for this

Alternative rodent bait study to compare Brodifacoum with an alternative (to be further determined in discussion with ARC-Biosecurity). As a general rule it is useful to be able to switch baits occasionally rather than relying on only one specific bait.

Wasp research trial: wasps are a significant pest reaching high numbers in mid-late summer. They impact on the diversity and density of native invertebrates and are also a risk for volunteers, often affecting our ability to service bait stations at this time. Forest & Bird and ARC are cooperating closely on this issue, and are hopeful that the 2010-11 season

will include a research trial involving *Ark in the Park*, ARC, the University of Auckland and Plant & Food Research Ltd..

Localising kokako through microphone arrays (Phd study). Victor Obolonkin (University of Auckland's Department of Biological Science and Department of Physics) is planning to use the *Ark in the Park* as one of the locations for his thesis on localisation and classification of bird vocalisation using microphone arrays and signal processing techniques. It is hoped that this can assist in determining kokako locations even in dense and difficult terrain.

Additional monitoring for lizards using foam covers: Herpetological expert Trent Bell will work with the *Ark in the Park* project to prepare a workplan for *Ark* staff and volunteers to follow with regards to a new monitoring effort for skinks and geckos in *Ark in the Park* using lizard foam covers.

Continuation of ARC Regional Wide Biodiversity Monitoring: ARC will continue its 5 year regional monitoring programme, including field monitoring of 20 - 30 sites (over 5 years) in *Ark in the Park* as one of the Key Ecological Restoration Initiatives. Data collection will include vegetation plots, Foliar Browse Indices, Bird Counts and chew cards.

ARC will also set up a **monitoring programme to assess native gecko populations in the Waitakere Ranges**, and the *Ark in the Park* will be included in this.

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And of course the many volunteers who are the driving force behind *Ark in the Park* and without whom it could not be done.

10. Contact details

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