



Manawahe Kokako Survey Report

October 2010



Photo by Bruce Bancroft

Prepared for Bay of Plenty Regional Council and the Manawahe Kokako Trust

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Table of Contents

Introduction.....	3
Methods.....	3
Results.....	4
Table 1. Kokako Population Comparisons 2009/2010	4
Other Birds.....	4
Discussion	5
Table 2. Manawahe Kokako Survey Results Over Time	6
Table 3. Manawahe Kokako Pairs change over time.....	7
Comparison.....	8
Productivity.....	8
Table 4. Manawahe/Kaharoa/Onai Pair Comparisons.....	9
Carrying Capacity.....	10
Table 5. Potential Pair increase Rate Projections.....	11
Recommendations	11
References:	12
Graph 1. Manawahe Kokako Population Trend Graph	13
Graph 2. Manawahe Kokako Pair Total/Pair Trend Comparison	14
Graph 3. Manawahe / Kaharoa Trend Comparison	15
Map 1. Manawahe Kokako Area Surveyed 2010	16
Map 2. Kokako Pair Territory Comparison 2009-2010.....	17
Map 3. Potential Kokako Habitat (south block only)	18



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Introduction

The Manawahe Kokako Trust area and surrounds were resurveyed during October 2010 to establish the current status of the Manawahe kokako population. The previous census was conducted during May 2009.

Methods

Kokako are territorial birds, therefore calls and song are important if kokako are to retain their territories. Territory mapping is an essential tool in ascertaining population size.

Pre-recorded local kokako dialect was used during the survey to attract territorial kokako and was played through a portable speaker via MP3 digital player.

Two observers were used in tandem during the survey. To accurately determine kokako territorial boundaries, one observer would stay with observed kokako and follow them while the other would walk ahead playing kokako tape. Invariably kokako would follow the tape to the edge of their territory where they would remain and this is often when neighbouring kokako would turn up nearby, hence the need for two observers.

Both observers would communicate with walkie talkies to compare sightings, this ensured that no double counting or under counting occurred.

GPS tracking data and the proximity of kokako to bait station sites were used to construct territory maps on GIS mapping software.



Results

The May 2009 survey established the presence of 16 pair, 6 single and 4 juvenile kokako, giving a total population of 42 kokako in 22 territories.

This year's survey established the presence of 17 pair and 4 single kokako, a total population of 38 kokako in 20 territories.

The Cell-phone tower block to the north still contained only one pair of kokako which is included in the above totals.

Table 1. Kokako Population Comparisons 2009/2010

2009/2010 Kokako Population Comparisons				
	Pairs	Singles	Juveniles	Totals
May 2009	16	6	4	42
Oct 2010	17	4	0	38
Difference	+2 (1 pair)	- 2	- 4	- 4

The total effort used to carry out the territory mapping in the field was 27.25 person days.

I believe the timing of the survey was almost optimal. Surveying any later would have meant additional resurveying of nesting birds. The start of the breeding season is dependant on a number of conditions leading up to that point, dependent on the weather conditions prior to and subsequent food availability during the nesting period.

Other Birds

Tui and bellbird are still in very good numbers as are kereru. Robins and Pied Tit were not that noticeable. Robins seem to be confined to the Karaponga Steam sides. A Karearea (NZ Falcon) was seen and one heard on a separate day (possibly the same one or its mate).

Still of concern are the large number of Magpies seen and heard throughout all of the area surveyed.



Discussion

As can be seen, the total population appears to have dropped again, this time by 4 birds in the last eighteen months. The number of pairs has gone up by 1 pair whilst singles are down two and no juveniles would be present at this time of the year anyway.

A healthy kokako population with good pest control should increase by 50% each year.

Possible reasons for the slow growth rate, plateau and decline of this population are outlined below:

- **Disproportionate sex ratio.** In low populations of any species under threat more males are found to be present than females. Although pairs are observed, many turn out to be male/male pairs. The cause of fewer females in the population is mainly attributed to the next point.
- **Predation.** Possums, rats, stoats, hedgehogs, harrier hawks, NZ Falcon and cats are known predators of kokako, destroying eggs, chicks or adult females on the nest. Possum and rat populations are being controlled during the kokako breeding season. Stoat control was initiated in 2009 and may take 2-3 breeding seasons to show any impact on breeding success.
- **Competition.** Possums, rodents and hedgehogs compete for food such as young leaves, fruit and insect life. Possums and rats are being controlled during the breeding season but little is known about the impact of hedgehogs on the Manawahe kokako population. Magpies may also be competing for territories and impacting on kokako nesting attempts.
- **Inadequate pest control.** Pest numbers (predators and competitors) need to be at their lowest throughout the breeding season. Pests not under control at the start of the breeding season can delay or even halt nesting attempts for some kokako breeding pairs.
- **Genetic bottleneck.** A population's genetic variation can be greatly reduced by a bottleneck, and even beneficial adaptations may be permanently



eliminated. The loss of variation leaves the surviving population vulnerable to any new selection pressures such as disease, climate change or shift in the available food source. This is because adapting in response to environmental changes requires sufficient genetic variation in the population for natural selection to take place.

Table 1 and Graphs 1 and 2 show the population growth and decline in graphic form over the period of active management from the first census in 1997 through to the latest pre breeding census in October 2010.

Table 2. Manawahe Kokako Survey Results Over Time

Manawahe Kokako Survey Results				
	Pairs	Singles	Juveniles	Totals
May 1997				14
May 2001	8	4	4	24
Apr 2002	10	2	10	32
May 2003	14	3	3	34
May 2004	19	2	4	44
May 2005	21	2	7	51
Oct 2007	24	5	0	53
May 2009	16	6	4	42
Oct 2010	17	4	0	38

Although the overall population is down on the last survey, the number of pairs is up by one and that is one positive to be taken from the 2010 survey. Emphasis should be placed on breeding pairs in a population rather than overall numbers. In fact two new pairs (15 & 19, see **Map 1**) have been established but one pair (south of 8) has a single (7) left in its place. A single (11) followed us around a large area within and



outside of pair 13's territory. The tolerance shown by pair 13 to this bird led us to believe that this was one of their chicks from their last breeding season.

Some territories were surveyed two or three times on separate days to minimise the chance of over or undercounting. This included some single bird territories to ascertain whether they were in fact single or a pair (female may have been sitting on an early nest). At least two pairs of kokako had started nesting when the survey was commenced.

Table 3. Manawahe Kokako Pairs change over time.

	Pairs	Difference	% Change
May-2001	8		
Apr-2002	10	2	25%
May-2003	14	4	40%
May-2004	19	5	36%
May-2005	21	2	11%
Jun-2006	23	2	10%
Oct-2007	24	1	4%
Jun-2008	20	-4	-17%
May-2009	16	-4	-20%
Oct-2010	17	1	6%

Years shaded were not surveyed. The numbers were averaged from previous and following surveys.

The table above shows the percentage increase of pairs at Manawahe from the start of regular census operations. The years 2006 and 2008 were not surveyed and the numbers (shaded) have been averaged from the previous and following census surveys. As can be seen, the highest annual increase was 40% from 2002 to 2003; the overall annual average is 10.56%.



Comparison

These are some of my thoughts and extrapolations after the 2010 census of the Manawahe kokako population.

I include comparisons with similar a project, Kaharoa, which has had consistent pest control and kokako census work over the same number of years.

For clarity and less confusion I will use pair numbers as the main population data. This assumes that each pair is a male and a female, bearing in mind that there may or may not be male/male pairs in any population.

Kokako are monogamous and form long-term pair bonds; excess males hold exclusive territories but have no function in population terms¹.

Productivity

The annual productivity rate is the number of chicks fledged per female per year and is stated as a percentage. It is assumed that production is evenly split between male and female i.e. for every two birds fledged one is female and the other male. In this paper I will use the number of pairs recorded each year as a percentage in lieu of productivity as fledging rates are not known for any year of control. This number is easier to compare with other similar projects as kokako census operations are standard through most projects.

The average annual pair increase rate of kokako in the Manawahe area since the control of pests is approximately 11% per year. Unfortunately between 2007 and 2009 pair numbers were down by 33%. This saw a drop in pairs from the projects highest number of 24 pair in 2007 down to 16 pair in 2009. In 2010 the rate improved to 6% with a rise in numbers to 17 pair of kokako.

The drop in numbers is alarming and answers need to be sought. A comparison with the Kaharoa Kokako Trust's Aislbies Block census is sobering. The Aislbies Block has had consistent pest control for its last 9 years of kokako surveys. As can be seen in **Table 1** below, Manawahe pair numbers (8) were less than Kaharoa (12) at the

¹ Basse, B.; Flux, I.; Innes, J. 2002: Recovery and maintenance of North Island kokako populations through pulsed pest control.



start of pest control operations. Manawahe had good pair rates for the first 3 years whereas Kaharoa was a bit slower out of the blocks. At year 5 and 6 things were even but from there Kaharoa took small but steady increases and Manawahe lost pairs. The average annual pair increase of kokako over the nine years of pest control was 10.56% at Manawahe and 10.89% at Kaharoa, a difference of 0.33%. The increase in kokako pair from the start of pest control to the latest census is 213% (8 pair to 17) at Manawahe and 250% (12 pair to 30) at Kaharoa. If Manawahe had kept the same rate of increase as Kaharoa there would be 20 pair at Manawahe, which is only 3 pair down from the 17 there at the start of the 2010-2011 breeding season.

The table below shows the comparisons between Manawahe and Kaharoa blocks. The Onaia block has been added to this table but has only had six years of pest control.

As can be seen in all the areas, annual recruitment is not consistent. Field data in other kokako areas show a biennial pattern of fluctuating 'good' and 'bad' years². In good years there may be up to three successful nesting attempts and in bad years some birds may not even attempt nesting.

Table 4. Manawahe/Kaharoa/Onaia Pair Comparisons

Kokako Pair Comparisons						
	Manawahe		Kaharoa		Onaia	
	Pair	% change	Pair	% change	Pair	% change
Start	8		12			
Year 1	10	25	12	0		
Year 2	14	40	15	25		
Year 3	19	36	17	13		
Year 4	21	11	20	18	6	0
Year 5	23	10	23	15	17	183
Year 6	24	4	26	13	19	12
Year 7	20	-17	27	4	25	32
Year 8	16	-20	29	7	27	8
Year 9	17	6	30	3	28	4

Years shaded were not surveyed. The numbers were averaged from previous and following surveys.

² Basse, B.; Flux, I.; Innes, J. 2002: Recovery and maintenance of North Island kokako populations through pulsed pest control.



Carrying Capacity

The carrying capacity is the largest population of kokako an area can sustain in an area. It is dependant mainly on food availability and suitable habitat. Other factors such as population density and dispersal options come in to effect when an area reaches its carrying capacity. Carrying capacity is often worked out by dividing the total area by the smallest known territory of a known pair in that area. Small populations of kokako will have larger territories and larger populations will have smaller territories because of pressure from neighbouring kokako. Territories often overlap boundaries more so in the non breeding season when birds are more tolerant of neighbours and less territorial. During the breeding season, territories become more compact centering around the nesting area with the male patrolling while the female sits on the nest.

I include this section to show the potential carrying capacity of kokako in the area south of the Cell phone Tower block.

No kokako population has been free of pest-mammals for long enough to reach a new carrying capacity; all managed populations are still slowly increasing³.

The smallest territories in the Manawahe Kokako Trust main block are approximately 4 hectares. The potential suitable habitat for kokako to fill is approximately 512 hectares (see **Map 3**), which works out to be a carrying capacity of 128 pair of kokako. If the productivity rate stayed the same as it has been for the past 9 years at 1.11%, it will take another 20 years to reach carrying capacity in the area. If the productivity rate could be raised and sustained at 1.2% it would take less than 12 years. At 1.5% it would only take 5 years. This is all theoretical but does show the potential if production problems can be resolved and improved upon.

³ Basse, B.; Flux, I.; Innes, J. 2002: Recovery and maintenance of North Island kokako populations through pulsed pest control.



Table 5. Potential Pair increase Rate Projections

Potential Pair increase Rate Projections			
Year	1.11%	1.2%	1.5%
2010	17	17	17
2011	19	20	26
2012	21	24	38
2013	23	29	57
2014	26	35	86
2015	29	42	129
2016	32	51	
2017	35	61	
2018	39	73	
2019	43	88	
2020	48	105	
2021	54	126	
2022	59	152	
2023	66		
2024	73		
2025	81		
2026	90		
2027	100		
2028	111		
2029	123		
2030	137		

Recommendations

1. I recommend that if there is no significant increase in Kokako numbers after the next census, intensive monitoring using video surveillance be carried out over the nesting period. This is the only way to find out what is happening during the *vulnerable* breeding season.
2. That independent specialist advice is sought from Department of Conservation specialists.
3. That small bird monitoring be established as a routine method to monitor change in other bird populations
4. The next territory mapping is carried out from mid September 2011.



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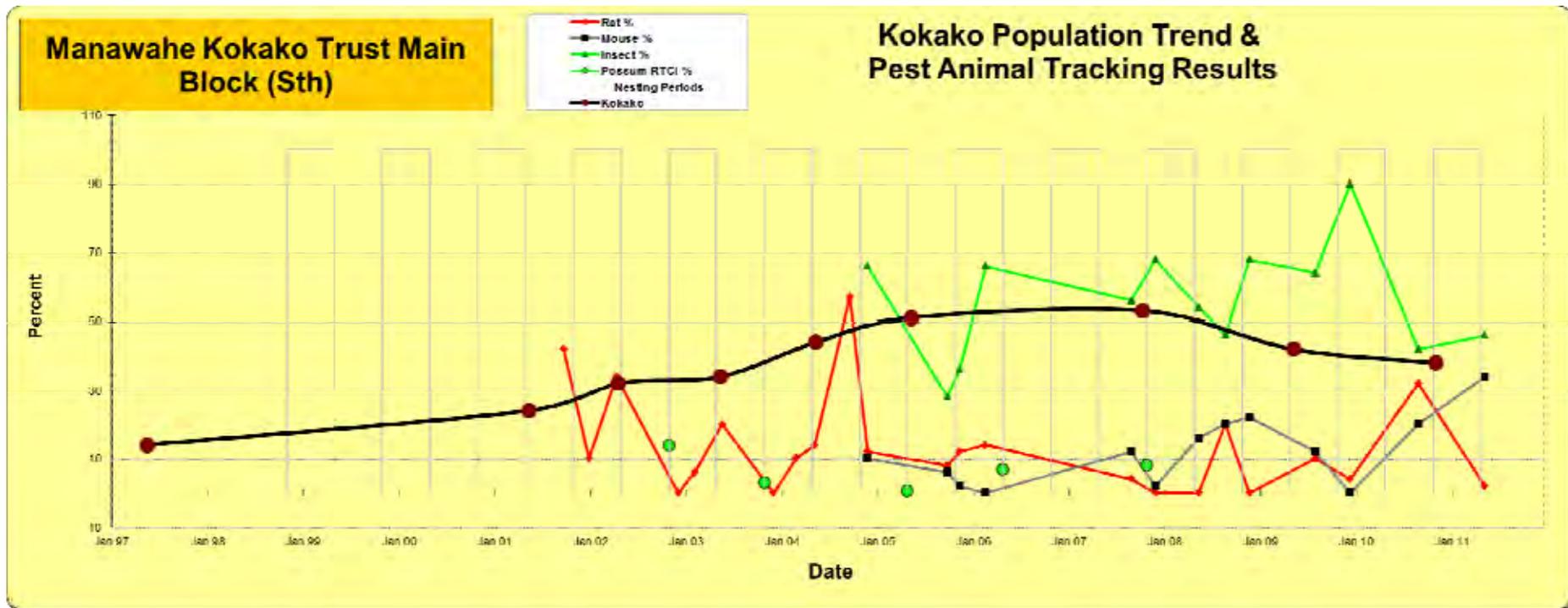
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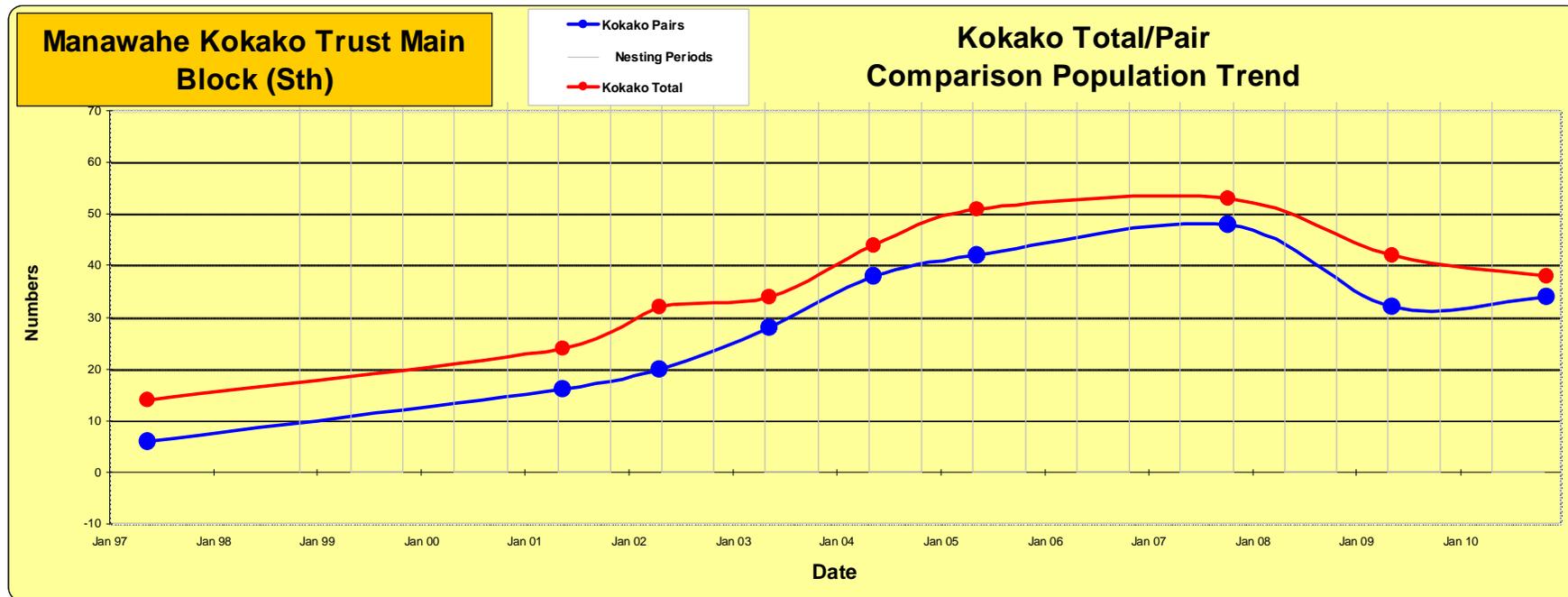
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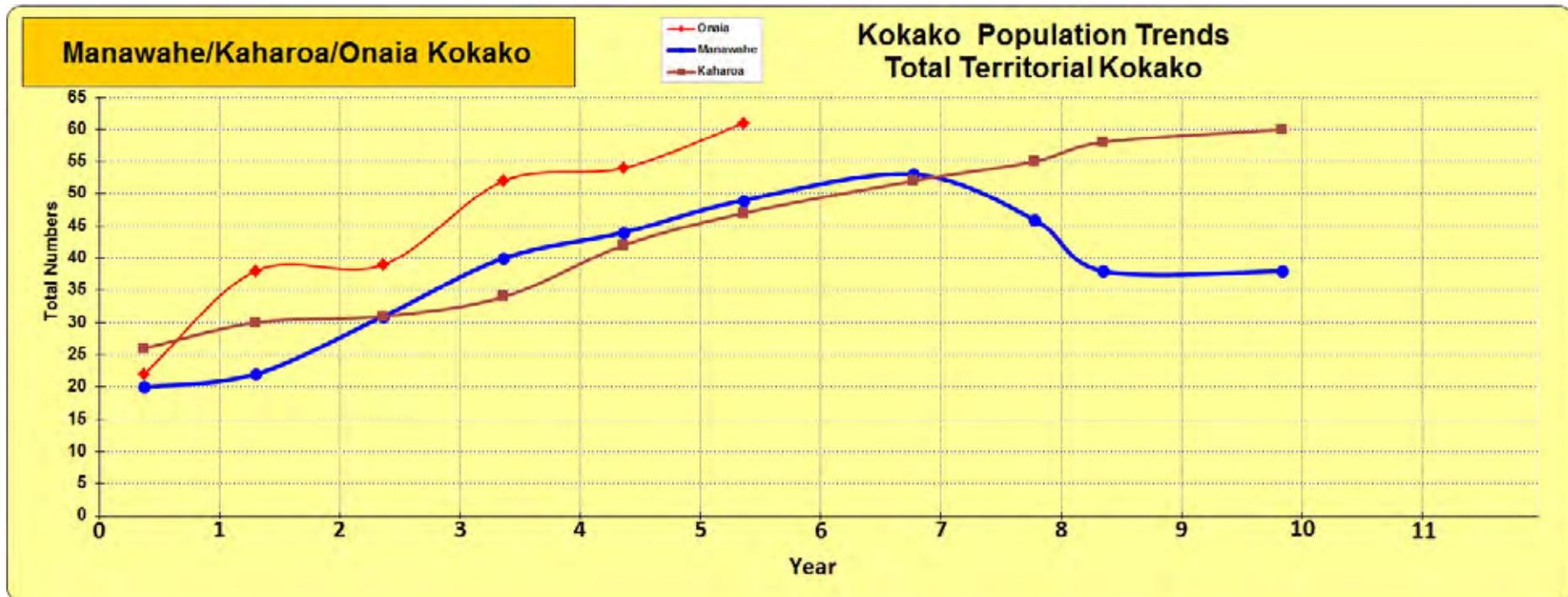
Graph 1. Manawahe Kokako Population Trend Graph



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Graph 2. Manawahe Kokako Pair Total/Pair Trend Comparison

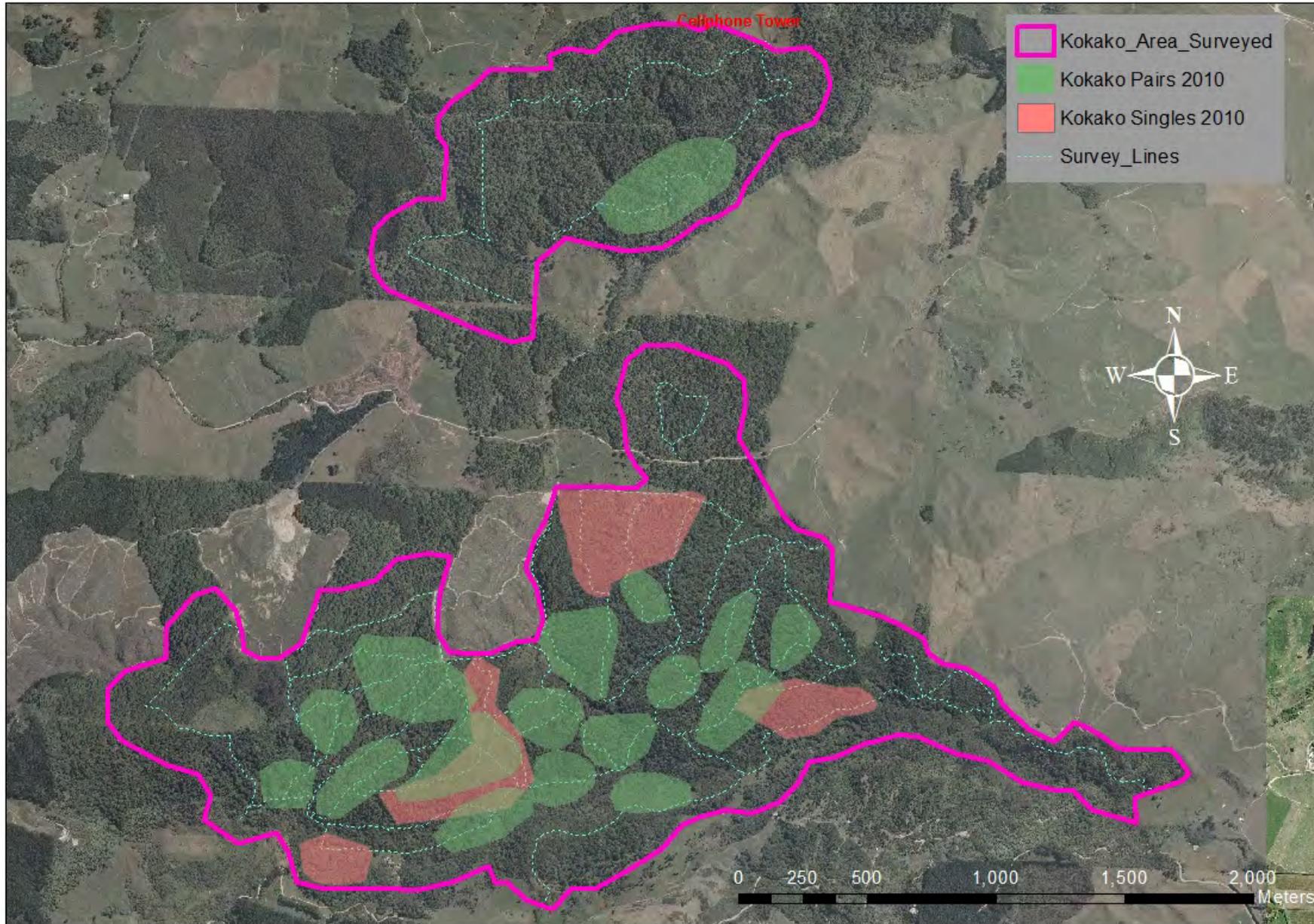


Graph 3. Manawahe / Kaharoa Trend Comparison (the Onaia block has only 6 years of pest control)



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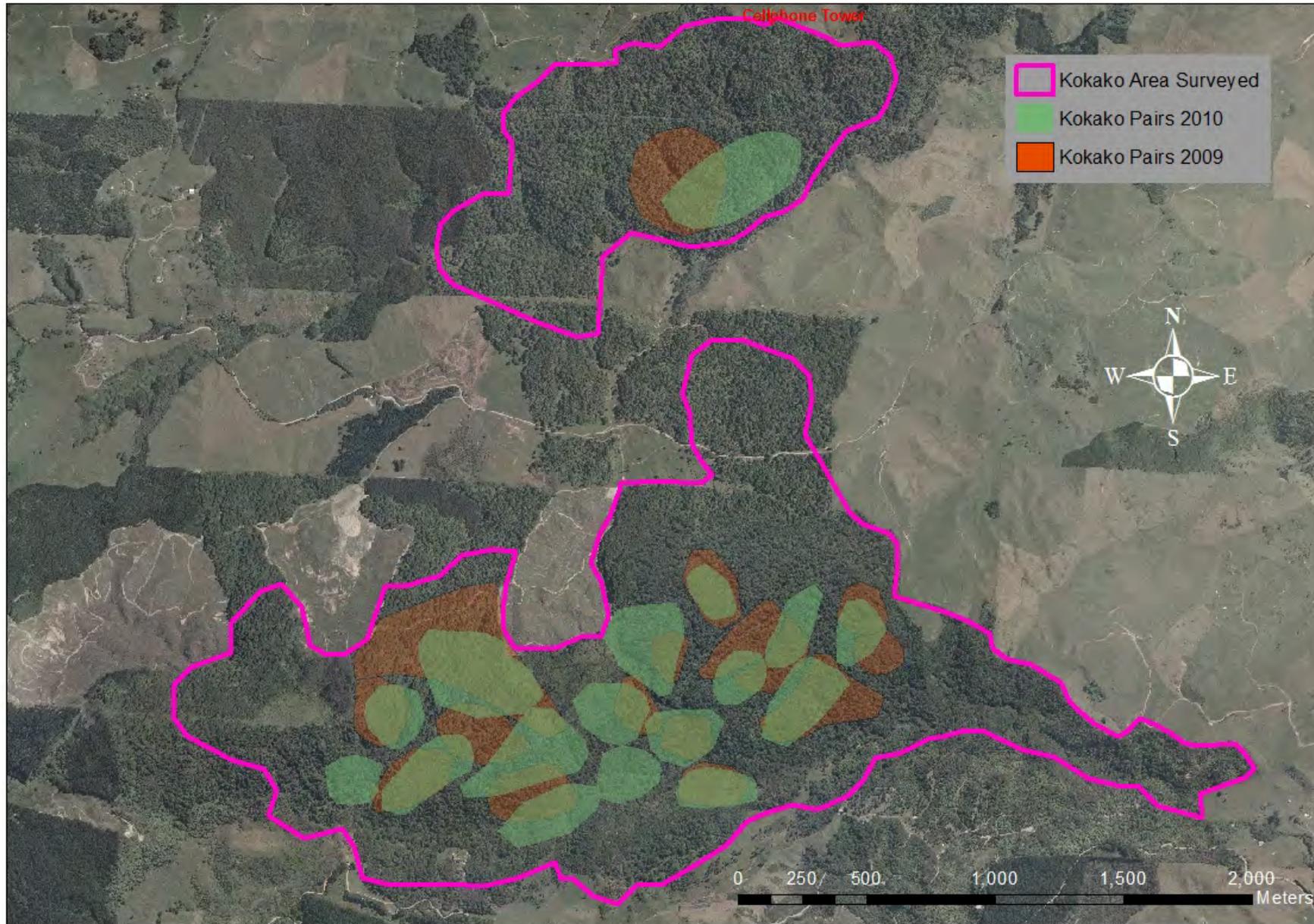
Map 1. Manawahe Kokako Area Surveyed 2010





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Map 2. Kokako Pair Territory Comparison 2009-2010





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Map 3. Potential Kokako Habitat (south block only)

