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WINDY HILL ROSALIE BAY CATCHMENT TRUST

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Bird Counts
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1. INTRODUCTION

The management of pests at the properties of Little Windy Hill Company Limited and Benthorn Farm successfully reduces rat densities[4] and captures cats[5]. These ongoing activities for the past seven-and-a-half years at Little Windy Hill and three-and-a-half years at Benthorn resulted in higher bird densities [6], and several typical bird responses (Box 1, Copied from the December 2006 bird report[7]). Support for such theoretical ecological predictions illustrates that the Windy Hill Rosalie Bay Catchment Trust is successful in achieving objectives such as sustaining and enhancing the biological diversity of the land, increasing bird life and nourishing the dream of providing a new home for declining numbers of birds on the New Zealand mainland such as robins and kiwi[1].

The Trust's success and efficient pest-management have resulted in most of their properties now having some form of treatment for some length of time. Hence, the Trust's own success required additional monitoring of sites not managed to clearly illustrate bird responses. This monitoring activity has now had its third occasion and I report on and interpret the patterns.

The Trust's continued activities clearly improved biodiversity in the southern part of Great Barrier Island as a result of sustained pest control over 230 ha at Little Windy Hill[2] and 40 ha at Benthorn Farm[3]. The monitoring of bird communities forms an integral part and has played an important role in directing and evaluating some of the management actions of the Trust. For instance, bird data provided information that partially led to the successful introduction of Robins. Monitoring of the locations where robins established, noted that settlement was in relatively species poor areas. Here I continue to revisit that observation and also check individual species trends as a potential constraint. For instance, continued increases of species in pest-managed areas may lead to spill-over into robin areas. If robins are affected by many other species, then the robin persistence at the study area may be at risk.

Box 1. Characteristics of bird communities at Little Windy Hill and Benthorn Farm

- Eight ecological guilds comprise the bird communities on both Great and Little Barrier Island.
- Non-native species replaces native species that is not present on Great Barrier Island.
- In some cases, species increased their densities to make up for missing species.
- The fraction of non-native species amongst birds is decreasing at Little Windy Hill.
- The densities of species may change when adding another species.
- It should lead to successful introduction of missing bird species here.
- Densities of species do not vary with each other at Little Windy Hill.
- Densities stabilized even in the presence of a newly introduced bird species.
- The relative density of non-native species decreased.
- Population growth of a species was low when densities were high and vice versa.
- There may be a wider range of densities on treated areas than non-treated ones.
- Introduced robins established on sites with relatively few other native species.

2. METHODS

2.1 Study areas

The Trust applies pest control to the primary catchments of the study area. These treated sites have kanuka/manuka shrubland with patches of an old broadleaf forest in between. Detailed methods of the trapping are available from Little Windy Hill Company Limited[8]. At present, an area with similar vegetation adjacent to the two properties serves as a reference site. The study area also includes places where introduced robins settled.

2.2 Data collection

A total of 18 bird survey transects (150m in length) comprise the Bird Monitoring Programme at present (12 at Little Windy Hill, 2 at Benthorn Farm, 2 in Robin Areas and 2 at the untreated or control area). Each transect has four sample points 50m apart which the Trust's field workers survey at least once every six months. The survey technique is standardized, but observers vary. The survey of a transect is as follows:

- At each point, bird counts are made for 3 minutes.
- Individuals heard and seen are recorded separately.
- A bird heard and seen is identified on the data sheet as such to ensure recording of that individual only once.
- For each bird recorded, the distance from the point to the bird is estimated and classified into 5 distance classes: 0-5m, <5-10m, <10-15m, <15-20m and <20-25m.
- No birds are recorded outside the 25m radius.
- No birds are recorded when walking between points.

2.3 Data analyses

I used a modified distance sampling technique[9] to address the repeated sampling and estimated the densities of the birds for each of these transects. In this way, I generated a data set containing the density for each species on each of the transects.

3. RESULTS and DISCUSSION

Patterns noted for the two transects sampled in the area that received no management suggested that in June 2006 densities here did not differ much from those transects in areas that did receive treatment (Fig. 1). By December 2006, the densities of birds on untreated sites are at the lower end of the densities at the treated sites. This pattern was not strengthened as suggested should happen – densities on untreated sites were the same as the mean density on treated sites in June 2007. Note that the many transects on the pest-managed sites continued to exhibit a large range of densities. Three possibilities may explain this anomaly since I expected densities to be consistently higher on pest-managed sites. The first instance is most obvious – there is no difference. However, given the results obtained previously for individual sites following treatment, this is unlikely. In the second instance, it is likely that the present time series is short (1.5 years) so that differences will become more accentuated with a larger sample size and over time. Thirdly, it is likely that site-specific differences mask real differences. Individual bird trends at a specific site will be the most sensible way to accommodate this constraint, but analyses of these needs relatively long time series. I expect that changes on treated sites will be primarily zero or positive while those on untreated sites will be zero and negative. This prediction will be evaluated after two years of survey.

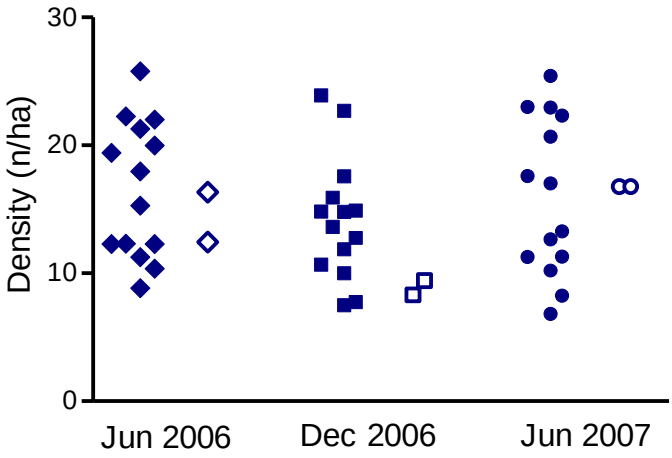

Figure 1. Comparison of total bird densities noted on the sites of the Trust that has received pest control (solid symbols) against two transects surveyed on a site that has not had any pest control (open symbols). I present data collected since June 2006. Robin sites are not included.

I combined all three occasions of bird counts since June 2006 to compare sites that had robins with those that did not. Kaka and kereru were absent while tui and silvereye densities were higher on general sites than on robin sites (Fig 2). The total densities of these different sites were 16 birds per hectare during June 2006, and 14 birds per hectare on general sites compared to 11 birds per hectare at the robin sites in December 2006. In June 2006, the robin sites again had fewer birds per hectare than the general sites – 16 versus 12. Other species may thus influence where robins settled during introductions. In this case, they most likely chose those places with the least amount of competitors.

A concern that could arise is that changing bird densities on pest-managed areas may have post-introduction effects on robin persistence because robin settlement sites are likely to be on the edge of the management areas or even places that have not received any management. If such robin settled sites receive spill-over birds from adjacent sites, negative species interactions may cause robins to leave which may lead to a higher chance that an individual robin might die. Such mortality could have risk for the long-term success of the robin introduction.

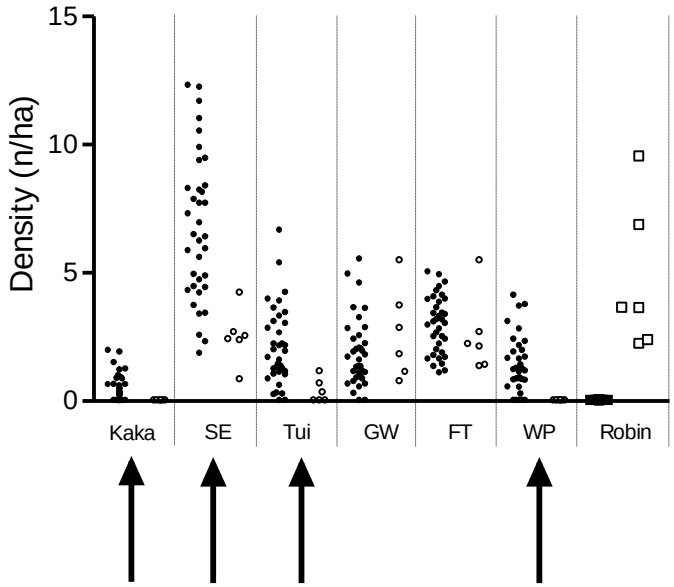

Figure 2. Comparison of bird densities for site with robins (open symbols) with those that did not have robins (closed symbols). I show densities for each transect sampled from June 2006 to June 2007. The arrows indicate species with lower densities at robin sites.

I first checked whether birds on pest-managed areas still have higher densities after management started than before. Only one species, grey warbler, had lower densities after management than before, but the difference was small (Table 1). In general, individual bird species had higher densities after pest-management was initiated. Therefore, there exists a potential source from which birds could colonize or spill over onto robin sites.

Table 1. Average densities (*n/ha*) before and after pest-management started and the change observed.

Species	**Before**	**After**	**Change**
Kaka	0.12	0.72	0.60
Silvereye	4.73	6.99	2.24
Tui	0.84	2.52	1.68
Grey warbler	2.25	2.16	-0.09
Fantail	2.63	3.60	0.97
Kereru	0.64	1.34	0.69

The recent changes of these species on pest-managed sites were variable on each of the transects. Even so, these centred on no change (Figure 3). There are three ways in how this could happen. First, births and deaths are exactly equal and no birds move in or out of the area. Secondly, deaths exceed births, but net movements into the area compensates for such losses. And thirdly births exceed deaths, but net movements out of the area result in no change. It is the last scenario that is of concern for the persistence of robins. I thus checked to see if these individual species increased on robin sites. With the exception of tui, these species may be declining so that at present bird spill-over from pest-manage sites is minimal and unlikely to threaten the persistence of robins at least in the short term.

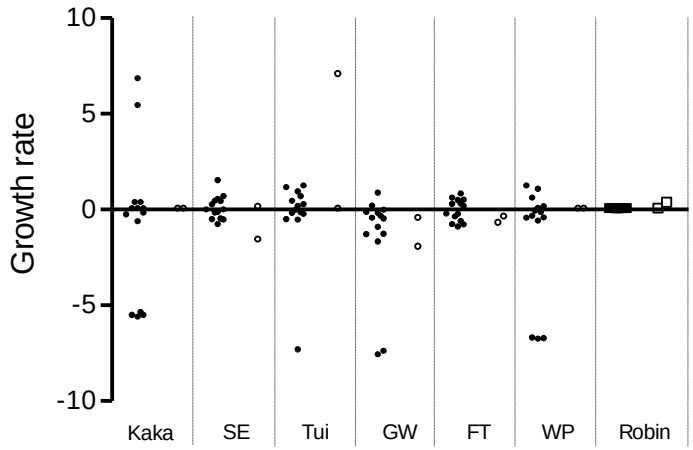

Figure 3. Comparison of exponential population growth rates of individual species for site with robins (open symbols) with those that did not have robins (closed symbols). I show growth rates for each transect sampled from June 2006 to June 2007. SE – silvereye, GW – grey warbler, FT – fantail, WP - kereru.

4. CONCLUSIONS

The comparison of treated with untreated sites did not confirm the positive influence of pest management on most native birds on Great Barrier Island. However, the long-term data clearly illustrate that bird densities are higher after pest-management started than before. In this regard the Trust is continuingly improving bird life. A second objective, nourishing the dream of introducing robins and kiwi has been partially realized. Robins appear to have established well on species-poor sites and

persistence is unlikely to be threatened by other native bird species in the immediate future.

5. RECOMMENDATIONS

The bird counts at Little Windy Hill and Benthorn Farm continue to contribute to understanding how small ecosystems here respond to management. The value of the present control sites are limited by the short time of monitoring. Continued monitoring will allow appropriate assessment using these sites. The value of the long-term data needs to be maintained – that is the strongest information against which to evaluate objectives at present. Even though site treatment enhances all native birds, robins appear to avoid those sites with many other species. I suggest that counts continue and focus on how the interaction between introduced and native bird species influences bird densities.

6. REFERENCES

1. Smit, A-M & Ferreira, S.M. 2002. *Special Report: Review of rodent control – April 2001*. EcoRAP Contract ECO006, EcoRAP Report ECO006-06, Little Windy Hill Company Ltd, Box 4, Tryphena, Great Barrier Island.
2. Smit, A-M & Ferreira, S.M. 2002. *Cat control at Little Windy Hill.* EcoRAP Contract ECO006, EcoRAP Report ECO006-08, Little Windy Hill Company Ltd, Box 4, Tryphena, Great Barrier Island.
3. Smit, A-M. & Ferreira, S.M. 2003. *Little Windy Hill Monitoring Programme: Bird Counts Dec 2002*. EcoRAP Contract ECO006, EcoRAP Report ECO006-10, Little Windy Hill Company Ltd., 429 Rosalie Bay Road, Tryphena, Great Barrier Island.
4. Ferreira, S.M. 2006. *Little Windy Hill Rosalie Bay Catchment Trust Monitoring Programme: Bird Counts Dec 2006.* EcoRAP Report ECO006/012-5, Little Windy Hill Company Ltd., 429 Rosalie Bay Road, Tryphena, Great Barrier Island.
5. Little Windy Hill Company Limited Annual Report and Newsletter #5, May 2000.
6. Peter Speck, Benthorn Farm Pest Management Project, Rosalie Bay Road, Tryphena, Great Barrier Island.
7. Little Windy Hill Development Proposal, April 2000.
8. Judy Gilbert, Little Windy Hill.
9. Buckland, S.T., Anderson, D.R., Burnham, K.P. & Laake, J.L. 1993. *Distance sampling: Estimating abundance of biological populations.* Chapman & Hall, New York.