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WINDY HILL ROSALIE BAY CATCHMENT TRUST

EcoRAP Contract: ECO006 & ECO012
EcoRAP Report: ECO006/12-8

Bird Counts
June 2008

September 2008

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INTRODUCTION

The management of pests at the properties of Little Windy Hill Company Limited and Benthorn Farm started in 2000 and was successful in reducing rat densities since 2000. This, together with continued cat trapping let to observers recording over eight years of intensive management several typical bird responses. Although these responses support theoretical ecological predictions, the ultimate question for managers and land owners is: are there more birds?

In this final report I reduce the broad pest-management objectives to the simple question of whether there are more birds now than before. This may ultimately be seen as reflecting on the Trust's success. There is some complexity in answering this question, primarily associated with previous recorded patterns that birds don't respond at the same rate in different places and neither did surveys start at the same time on all bird transects.

Pest Management Objectives

- Sustaining and enhancing biological diversity
- Increasing bird life
- Providing a new home for declining species such as robins and kiwis

The major observations the past eight years are summarized in the box below. In general, most common species have increased substantially in densities after pest-management compared to what these were before. This in itself suggest that the Trust's continued activities will keep on improving biodiversity at Great Barrier Island, given the regional processes that has become apparent because of sustained pest control over 230 ha at Little Windy Hill and 70 ha at Benthorn Farm.

Nearly since the inception of pest management, the monitoring of bird communities formed an integral part. This must stand as one of the few examples of managers measuring biodiversity outcomes and not just how well they performed a management action from the start of a programme. As a result, bird monitoring played an important role in directing and evaluating some of the management actions of the Trust. Here I bring the eight years of data together in the most simple measure – how did bird numbers and the number of species change on each of the transects where birds were counted?

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 is a wider range of densities on treated areas than non-treated ones.
- Introduced robins established on sites with relatively few other native species.
- Five common species increased in density after pests were managed.
- Grey warbler densities declined after pests were managed.
- Responses of birds to regional and climatic processes may mask short term gains.
- Established introduced birds may encounter competitors later due to regional processes.

METHODS

Study areas

The Trust applies pest management to the primary catchments of the study area. Monitoring of birds focus on these areas, but also include includes places where introduced robins settled and where no pest management has taken place.

Data collection

A total of 18 bird survey transects (150 m in length) comprise the Bird Monitoring Programme at present (three on ridges and three in valleys in an area pest-managed since 2000, and three on ridges and three in valleys in an area pest-managed since 2002 at Little Windy Hill; one on a ridge and one in a valley at Benthorn Farm pest-managed since 2002, two in areas where robins settled and two relatively

newly established transects in an untreated area). Each transect has four sample points 50 m 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: 0-5 m, <5-10 m, <10-15 m, <15-20 m and <20-25 m.
- No birds are recorded outside the 25 m radius.
- No birds are recorded when walking between points.

Data analyses

All the raw data was reduced to bird densities using a modified distance sampling technique to address the repeated sampling. I thus have a data set containing the density for each species on each of the transects. I added all densities of a species together to obtain a total density of birds for each transect every time a survey session was completed. I then plotted this against time for each transect separately and calculated the exponential change over time. I also counted how many species were recorded on each transect for every session that transects were surveyed and plotted this against time since surveys started.

RESULTS and DISCUSSION

All seven of the original ridge transects did not increase significantly. However, I noted significant increases on 3 of these in the last 4 years. A similar pattern was noted for valleys, but in this case 5 of the seven transects showed significant increases in the past four years (Figure 1). These results reflect two aspects – lag effects of bird community responses to management and the reduction of pests, and regional interactions. Given the negative trend, albeit from a relative short time series, noted for the control sites, management has remarkably prevented long term declines. The recent increases at most transects suggest that outcomes of restoration projects may only be apparent in the medium rather than short term. The Trust has therefore made a substantial difference to birds across Great Barrier Island.

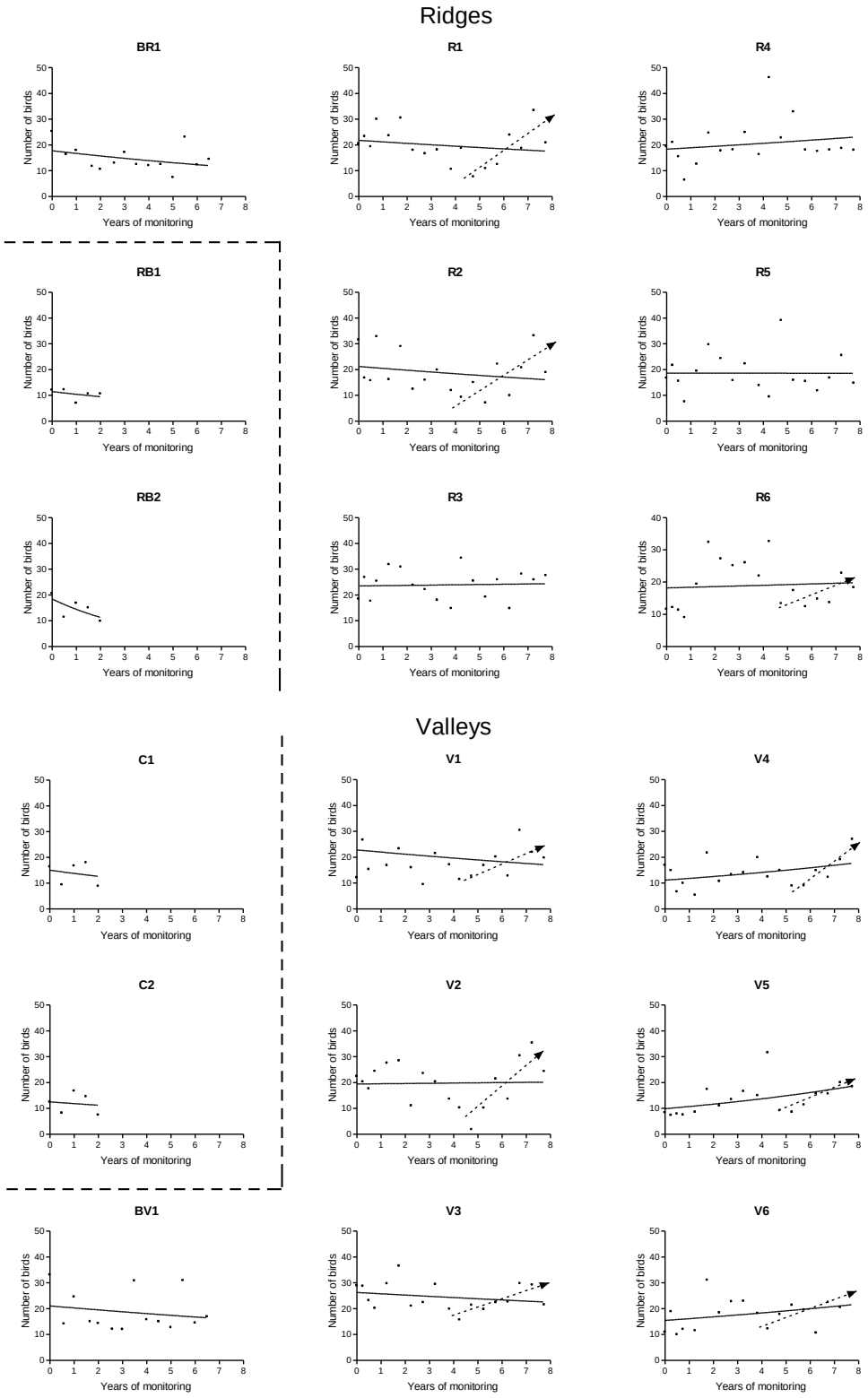

Figure 1. Transect-specific numbers of birds recorded since start of monitoring on a transect. The solid lines represent the overall trend. Several transects had substantial increases in the last 3-4 years. I illustrate these using broken arrows. R – ridge transects, V – valley transects, BR – Benthorn ridge, BV – Benthorn valley, RB – robin transects, C – control transects.

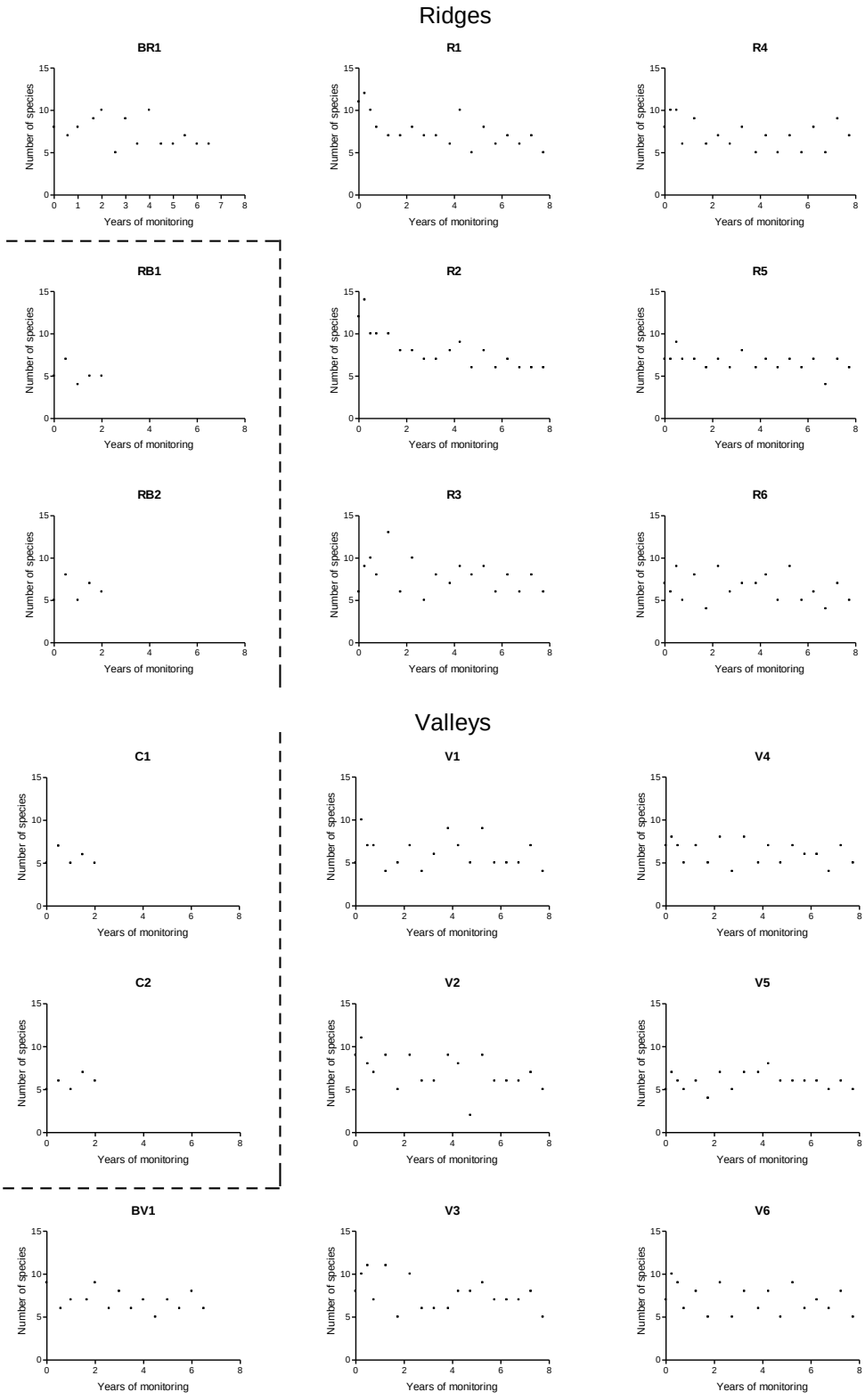

Figure 2. Transect-specific numbers of species recorded since start of monitoring on a transect. The solid lines represent the overall trend. R – ridge transects, V – valley transects, BR – Benthorn ridge, BV – Benthorn valley, RB – robin transects, C – control transects.

The number of species stayed relatively stable irrespective of where a transect was located. Between 5-10 species are usually noted. A few transects appear to have had many more species during the early stages of monitoring. This most likely resulted from non-native passerines which have become less common over time as the system responded to pest management actions.

The stability of the number of species over the monitoring program is expected given the extant species pool on Great Barrier Island. This will only improve if more species become available through introductions and once these introductions has established well. Although robins are regularly encountered on the transects through the areas where robins were released, the general effect will take some time to be detectable in bird species richness measured through counts at transects in other parts of southern Great Barrier Island.

Even with these various dynamics in place, comparison of new control sites with that at Windy Hill's managed sites clearly illustrate that pest management is having a substantial effect on the bird densities in the region (Figure 3).

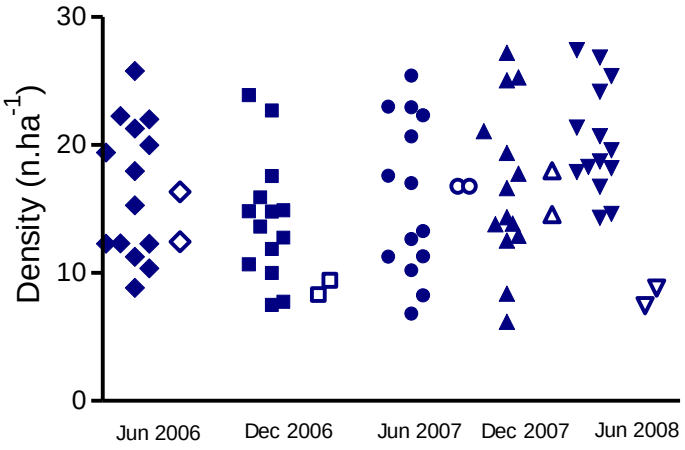

Figure 3. Comparison of total bird densities noted on the sites of the Trust that has received pest control (solid symbols) against two transects surveyed on a site that has not had any pest control (open symbols). I present data collected since June 2006. Robin sites are not included.

CONCLUSIONS

The description of changes in individual numbers of birds as well as species over the monitoring period

illustrate that the Trust have maintained and recently enhanced bird communities substantially compared to what it was eight years ago. Several important lessons have been learned, but perhaps the most important is that tangible restoration outcomes may need to overcome lag effects and regional processes before detectable changes in biodiversity response variables will be noted. The establishment and continuation of bird monitoring at the properties managed by the Trust provided the basis for these conclusions.

ACKNOWLEDGEMENTS

This is the last report that I will formally provide to the Trust. I wish to make use of this opportunity to thank Judy Gilbert, her enthusiasm and all the various staff that has been involved with bird monitoring over the years. It has been an outstanding experience for me and a privilege to experience Little Windy Hill and the restoration there off on a magnificent island. I will follow the progress of this remarkable project with great interest and certainly hold it as an example of how small things make big differences to my African colleagues.

Note: Additional information and references are available from Sam Ferreira.