

# **Island Biogeography Study of the Tukang Besi Archipelago 2005**

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This project was designed to expand on previous datasets of population biometrics accumulated between 1999 and 2003. Principal amongst the aims of the 2005 study was to acquire information from the two major southern islands of the Tukang Besi Archipelago, namely, Tomia and Binongko. Incidental to the previous datasets, but of equal interest, was the accumulation of biometric information from bird populations on Runduma.

Whilst the data collected was fulfilling this role, it was also providing information for two final year honours dissertations. The titles of these dissertations are:

1. An investigation into the relationship between island size, habitat diversity and biodiversity of birds.

Principal Investigator: Rachel O'Sullivan

Assisted by: Henry Ali Singer, Clodagh Dooley, Melanie Sheridan, David Duffy

2. An investigation into the relationship between the light-gathering capabilities of avian eyes and the timing of their song activity in tropical regions.

Principal Investigator: Clodagh Dooley

Assisted by: Henry Ali Singer, Melanie Sheridan, David Duffy, Rachel O'Sullivan, Naimh McKeon

The first project (Biodiversity) surveyed the avian biodiversity of the islands by means of point counts. By combining the data from numerous point counts in different habitats, a biodiversity index may be created for each island. Following habitat surveys and analysis of topographic maps of the islands, a habitat diversity/complexity index may also be computed. A comparison of these two values will be the central investigation of the project.

Analysis of the data collected for the Biodiversity project involves relatively complex statistical techniques. This analysis will not be undertaken by the student until their return to university. The question being addressed here is a deeper investigation of the species/area relationship addressed by early biogeographical studies. The simple model suggests that area alone may explain the biodiversity of any animal population on an

island. The Biodiversity project aims to identify the role of habitat diversity on smaller islands and discover if it may explain variation not allowed for by the simpler model.

The second project (Birds' Eyes) surveyed the song activity of all bird species between the times of 4:45 am and 6:30 am on each island. By recording the light intensity at one-minute intervals it was possible to identify, with reasonable accuracy, the light intensity at which each bird species started to sing. The second half of the Birds' Eyes project involved the capture of a variety of bird species. The birds were photographed in various postures to allow the estimation of the size of their eyes. They were also photographed in a "dark box" to gauge the extent to which their pupils could dilate in low light conditions.

The calculation of the light-gathering capability of any given bird's eye is not straightforward. An analysis of photographs taken of dark-adapted eyes will be used to calculate an F-number for each species trapped. These values will then be compared with the light intensity (measured in lux) that the birds first started to sing during the dawn chorus. Previous work by researchers based in the UK has shown a strong negative correlation between the F-number of a bird's eye and the time it starts to sing in the morning (relative to civil twilight). It is anticipated that the tropical species will follow this trend. However, it is hoped that we may gain a little insight into the "queuing system" birds use in the tropics. As dawn and dusk are relatively brief occurrences in the tropics, it is possible that the airwaves may become overly congested with bird song if each species simply sang when it was able to. It is possible that certain species "wait their turn" in the congested tropical dawn chorus, or perhaps that the birds use a greater variety of frequencies for their song. We have recorded a number bird songs to aid in this investigation.

The Island Biogeography project managed to visit the islands of Wangi-Wangi, Tomia, Binongko, Runduma and Lintea Selatan in the four weeks between 24<sup>th</sup> August 2005 and 21<sup>st</sup> September 2005.

The trip to Wangi-Wangi helped to confirm the presence of a unique population of White Eyes (*Zosterops* sp.). We hope to co-ordinate a return visit to the island with a representative of the Bogor museum in order to obtain a specimen of this bird for their collection. We believe the species is as yet undescribed.

Data from the southern islands confirms that the same subspecies are present throughout the archipelago. However, there is strong evidence to suggest that Runduma, despite being politically allied to the Wakatobi Kabupaten, should be considered as a separate entity ornithologically. Biometrics from a number of species suggest that they are distinct from the main archipelago. These differences may prove significant enough to allow their description as new subspecies.

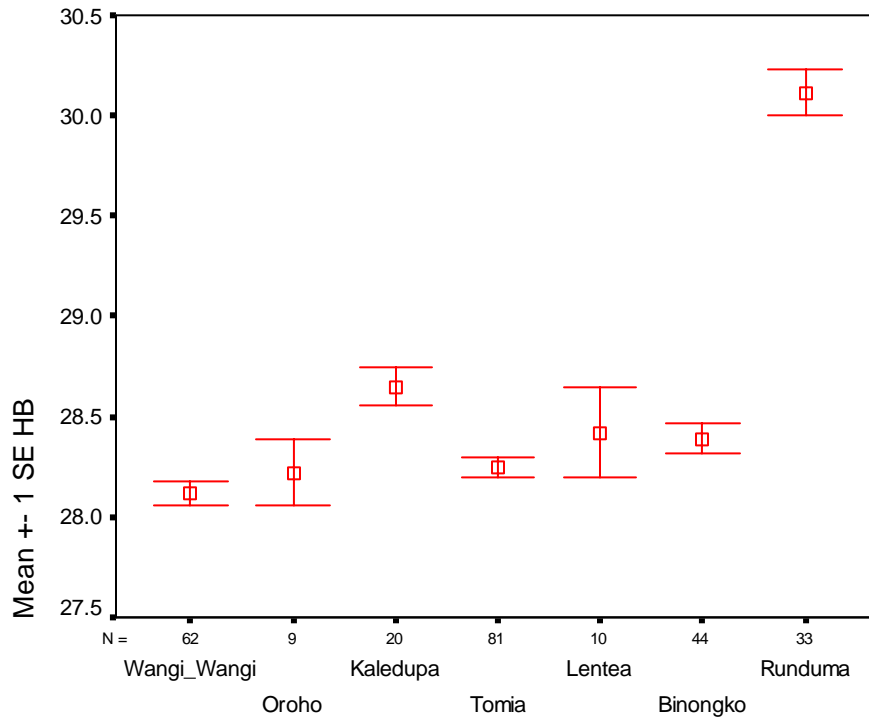


Figure 1. Total Head measurements for Lemon-bellied White Eyes (*Zosterops chloris*) from a selection of islands in the Kabupaten Wakatobi.

Figure 1 shows a comparison of total head length (head and bill) for Lemon-bellied White Eyes across the Tukang Besi. The size of the birds remains reasonably constant from Wangi-Wangi to Binongko, but the Runduma birds are noticeably larger.

Figure 2 shows a derived mobility measurement (the wing length of the bird divided by its weight) for Island Monarchs. These birds are notorious for their travel between islands, and are sometimes referred to as “supertramp” species. Despite this ability to travel, it appears that the Runduma birds carry less weight per unit wing length than birds on any of the other islands nearby. This may be an adaptation to life on a remote island, or it may be indicative of a divergent population.

Finally, figure 3 shows a relatively small dataset for Emerald Doves. The plotted values are for the size of the birds’ bills relative to their total head size. The large ratio seen in the individual from Runduma may indicate a reliance on a different food source to the birds from the other islands.

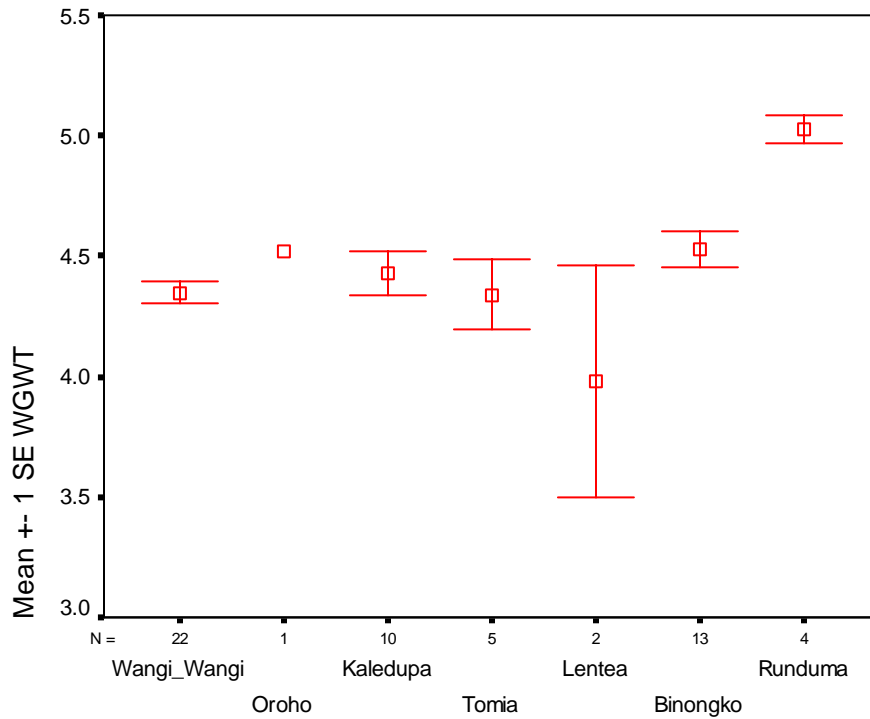


Figure 2. A derived mobility measurement for Island Monarchs (*Monarcha cinerascens*) from a selection of islands in the Kabupaten Wakatobi.

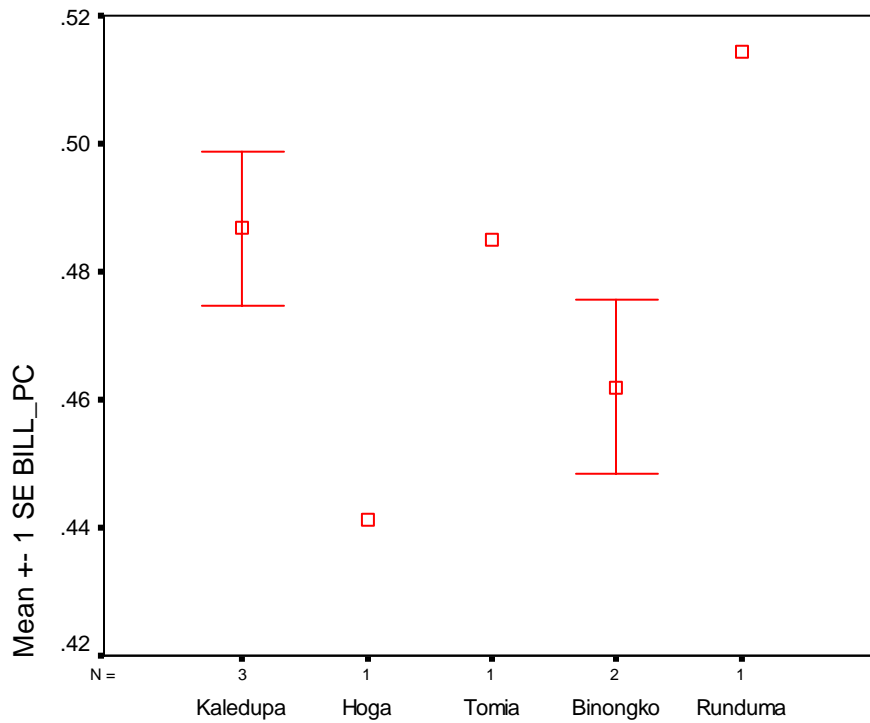


Figure 3. A derived food source measurement for Emerald Doves (*Chalcophaps indica*) from a selection of islands in the Kabupaten Wakatobi.

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