

# THE LONG & WINDING ROAD: Beetles and Urban Fragmentation



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## 1 "HELP!"

Urban areas contain great potential for the conservation of New Zealand's native species. Vegetated urban reserves are known to support native birds, reptiles and invertebrates.

However, these populations are still vulnerable to extinction due to human impacts. To protect them, we must seek to understand their responses to these impacts and use this information in our management.

“To protect [native urban] populations, we must seek to understand their responses to human stresses and use this information in our management.”

**Thresholds** are levels of stress above which a species' response changes drastically. They are a useful tool that allows us to pinpoint the level of impact that a species can handle.

To demonstrate their utility, we studied the beetle *Brachynopus latus* and its' response to isolation within urban reserves.

## 2 "HOW DO YOU DO IT?"

**FOCAL BEETLE - *Brachynopus latus***  
(Coleoptera: Scaphidiinae).



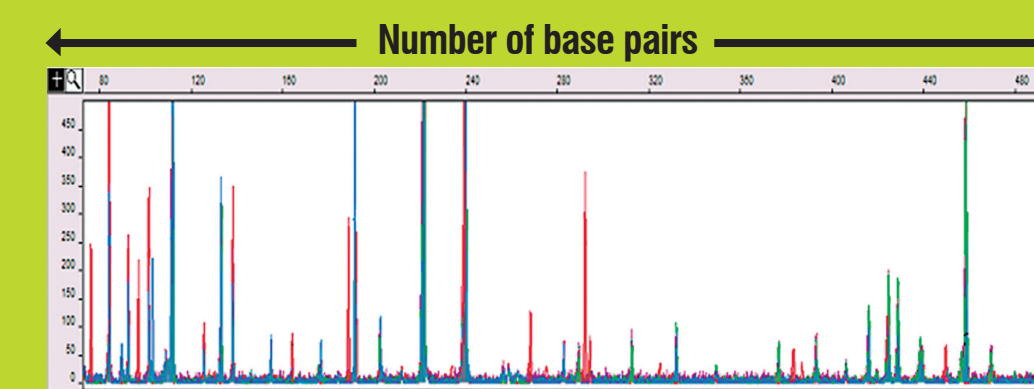
- Small Size (1.5 - 2mm)
- Endemic
- Fast Runner
- Flightless

*B. latus* were collected from urban reserves around the North Shore, Auckland, New Zealand. Control specimens were collected from the nearby continuous forest of the Waitakere Ranges.

## USING MICROSATELLITE ANALYSIS

Microsatellites are a type of DNA. They are not affected by natural selection, making them useful for examining how related individuals are to each other. Relatedness can be determined by looking at differences in the number of microsatellite base pairs [A,T,C,G].

We attached fluorescent dyes of different colours to the ends of *B. latus* microsatellites. This allowed a Prism Genetic Analyzer to measure the number of base pairs in the microsatellites carried by each individual. The program allows us to read microsatellite size by showing coloured peaks at the corresponding number of base pairs, as shown to the right.



Two microsatellites were used in the data analysis. A regression graph (X vs Y) of genetic dissimilarity and distance was used to show isolation effect.

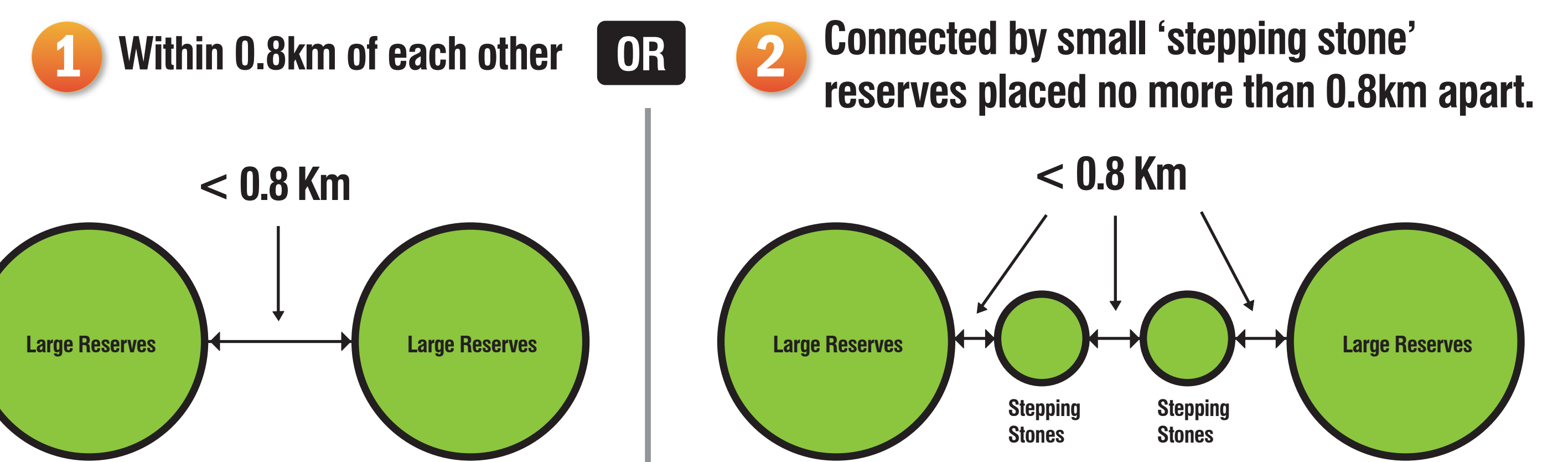
## 4

## "COME TOGETHER"

### Urban Reserve Design

These results suggest that *Brachynopus latus* individuals are rarely dispersing more than **0.8km**.

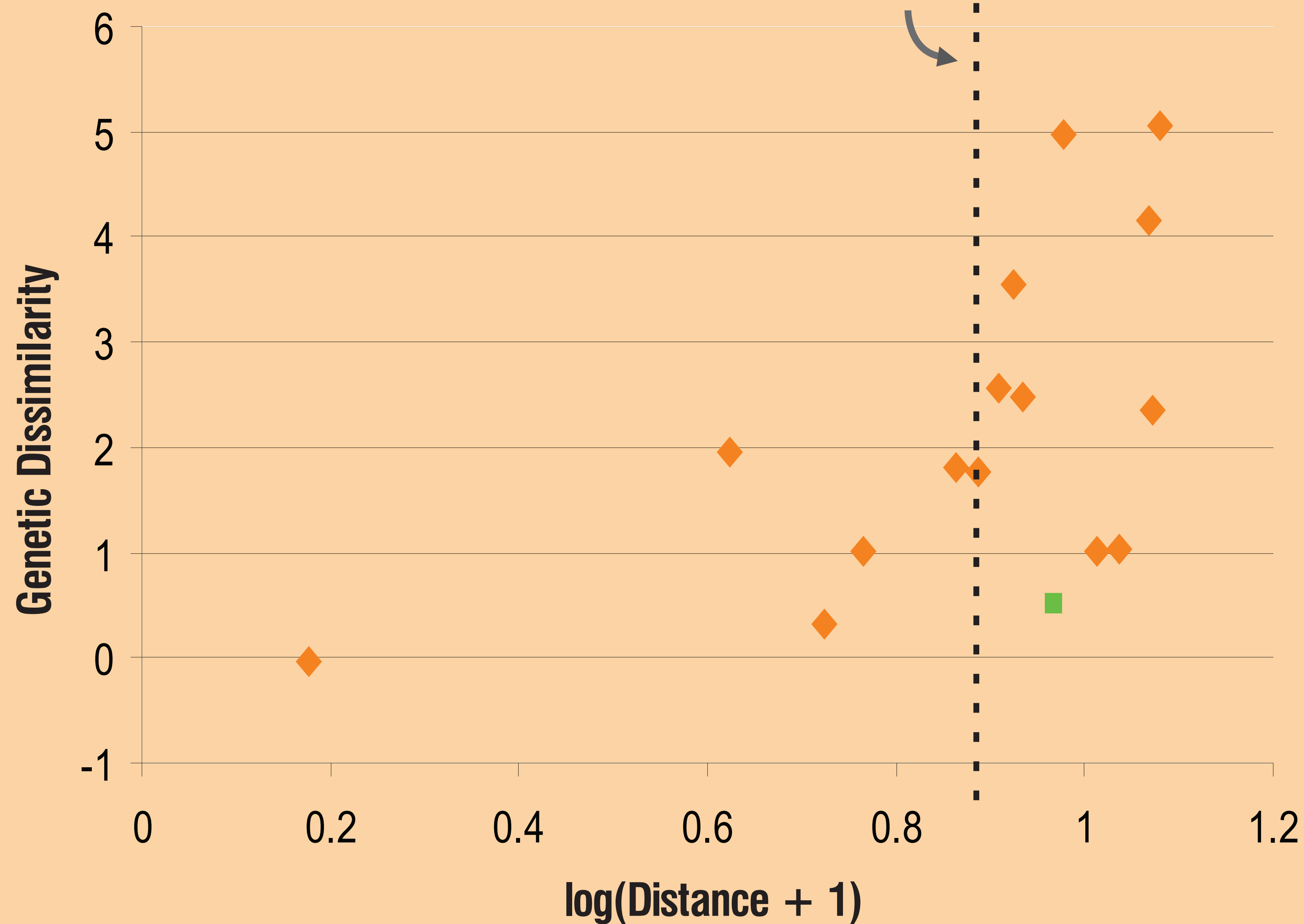
Ideally, large urban reserves would be:



## 3 "I WANT TO TELL YOU"

- Genetic dissimilarity responds exponentially to geographic distance.
- Distance explains around 38% of the variation in genetic dissimilarity and the relationship is statistically significant ( $p < 0.05$ ).
- Genetic dissimilarity begins to increase rapidly after a threshold of about 0.8km.

Threshold of 0.8 Km



- ◇ Fragmented North Shore populations
- Unfragmented Forest (Waitakere Ranges)
- Threshold

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Pictured is the record cover of Abbey Road, the eleventh official album recorded by The Beatles.  
Beetles/Beetles illustration by DieselLaws