



## FINAL REPORT 2019

### **Securing the future of one of Victoria's threatened flora species**

This FAME project was led by the Conservation Ecology Centre and supported by The University of Melbourne and the Royal Botanic Gardens Victoria.

**How many hectares of land does your project cover?**

We have done multiple activities including translocating individuals from multiple source sites and establishing five translocation sites including one new population in the Otway Ranges. We also sourced leaves from all 14 sites (Figure 1) for the genetic analysis and conducted surveys for new populations at eight sites. We estimate that the areas of our new populations is approximately 1ha, however collection and survey efforts have covered a far greater area.

**How many landowners have been engaged because of the project?**

We have worked with multiple land managers including Parks Victoria and the Department of Environment, Land, Water and Planning (DELWP). This project was a collaboration between The Foundation for Australia's Most Endangered (FAME), the Otway Conservation Ecology Centre, and The University of Melbourne. Other stakeholders involved in this project include The Royal Botanic Gardens.

**How many primary species does your project involve?**

This project involves one primary species, *Astelia australiana*.

**How many collateral beneficiary species have benefitted from the project?**

This species provides habitat including food and shelter to multiple native bird, mammal and insect species. These species include Swamp Wallaby, Pygmy Possum, Agile Antechinus, and Bush Rat. Other species that use *A. australiana* habitat include Echidna and Wombat. Bird species include Superb Lyrebird, Eastern Spinebill, Silvereye, Olive Whistler and Lewin's Honeyeater. And many native insects visiting *A. australiana* include fly, bee, and ant species. It is also utilised by non-native species including Deer and Rat species. Other species in these areas would be expected to use them as habitat too but were not captured on camera. A summary of frugivores and pollinators from our camera trap surveys is presented in Figure 2. Images of some of the pollinators and frugivores from the camera traps are presented in Figure 3 and 4.

**How many trees have you been able to plant in the wild?****How many plants have you grown in nurseries? How many babies have been born?**

We translocated 200 *Astelia australiana* plants from source sites into new sites.

We have collected seeds at four sites during our monitoring and have successfully germinated approximately 30 seedlings. These plants are kept in the nursery and will be used to plant out into new sites in the Otway area when large enough.

Based on the population dynamic results from the genetic analysis we intend to create another three populations in the Otway Ranges to make a total of five Otway meta populations. These populations will be created with 50 individuals in each population using 60 individuals collected from all groups identified in the Central Highlands region and propagated in the nursery.

**How many successful reintroductions have you had?**

The one translocation in the created Otway site (-38.692887; 143.475751) has had good success with 42 of the 50 individuals planted remaining after 1 year.

### **On a whole, how many estimated surveys have been conducted?**

Overall eight surveys have been conducted. These include four in the Central Highlands region which located two new populations of about 30 (tributary of Pioneer Creek) and 80 individuals (tributary of Bjorksten Creek) respectively approximately 500 m from existing sites. In addition, we surveyed and established the monitoring effort at a new site (Meadows Creek) that was discovered by another group (WOTCH) in 2019. This new site has an estimated 500 individuals in it. We also conducted four survey visits in the Otway Ranges for new populations (Figure 5), however, we did not locate any additional populations in these surveys. Fortunately, we did find two potentially suitable sites for future translocation into during these surveys. In addition to these targeted surveys, staff from the Otway's CEC are looking for *A. australiana* when they do work near creek lines in the region.

### **Population dynamics from genetic analysis**

We analysed the genetics of 289 *A. australiana* individuals across the species range (14 sites) to understand the within and between site population dynamics of the species. At the landscape scale the species can best be divided into 5 groups (Figure 6). The genetic analysis also indicates that while there is similarity of *A. australiana* in most of the Central Highlands sites (group 3-orange) and even the Otway Ranges site (group 4 -purple) has some individuals that are similar to this main group suggesting that the species was once more widespread. The Woodall Creek (WC) site had members in groups 2, 3, and 5, within this one small site that is not expected to be geographically isolated like the Otway Ranges site. Similarly, the Trestle Bridge site had most members in their own group (group 1 -blue) and a couple in the core group (group 3 orange). Meaning that it is genetically distinct despite it being located on the same creek line as two other sites and not very far from other Central Highlands sites either.

Interestingly, if we look at a higher resolution at the genetic differences at the 13 Central Highlands sites only (without the Otway Ranges site), the differences are best described by 9 groups (Figure 7). Most sites still have common members (group 9), but we get the further division of individuals from the large site at Seven Acre Creek (7A) into two groups (group one and the core group 9). The Dave Ashton Site (DA) also gets split into two groups including the core group and its own group (group 6). Worlley Creek (WR) is now split from the main group into its own group. The Tarago site (TR) which is large and spread over a large area also gets split into a new group but continues to have some members similar to the core group. The two newly discovered site at Meadows Creek (MC) Feiglin Creek (FC) have all members in the core group.

Our analysis also indicates that threats associated with inbreeding are not currently an issue for the species populations at the landscape level and within the Central Highlands. This is good news for the species and means that if we collect individuals from a range of sites, specifically from sites with members in groups other than the core group, then we will have good genetic diversity to create new meta populations from.

We will continue to analyse the genetic data at the site level to better understand the species population dynamics to inform future conservation management including translocation. This analysis will also guide us in determining the most appropriate distances between meta populations to encourage gene flow between populations.

### **Communication of results to land managers and others:**

The translocation component of this study was published in:

- Parker, L. M. and Nitschke, C. R. (2019). Case study: Threatened plant translocation *Astelia australiana* (Tall Astelia). *Australasian Plant Conservation* 28, 18-20 (and cover photo of the journal).

These results were also presented in an interview in the media:

- Nobel, E. (2019). Australian Broadcasting Corporation (ABC) South West Victoria feature interview on the Tall Astelia broadcast on the ABC's Radio National 'Australia Wide' program 22/08/2019. Back episode available at: <https://www.abc.net.au/radio/programs/australia-wide/>.  
Online article: <https://mobile.abc.net.au/news/2019-08-25/why-scientists-are-trying-to-save-tall-astelia-in-the-otways/11442654?pfmredirect=sm>  
Video interview on ABC South West VIC Facebook page <https://www.facebook.com/1520784434804555/posts/2386768598206130?sfns=mo>
- Higgins, B. (2019) Help to save rare Otway's lily. Feature interview on my research. Colac Herald. 4th September 2019. Page 9.

The genetic analysis will be published in a peer reviewed journal.

This research was also presented by Michael Amor from the Royal Botanic Gardens at the Otway's Threatened Species Research Forum in August 2019:

These results will also be presented in a 10-minute presentation at VICBIOCON 2020 on Friday 7 February 2020.

We intend to communicate these results to Parks Victoria and DELWP in the form of presentations and reports.

We will continue to adapt and develop a long-term framework for the conservation of *A. australiana* across the landscape as the results of our translocations and further analysis of genetic results are assessed. These will be available to FAME upon request in the 2020.

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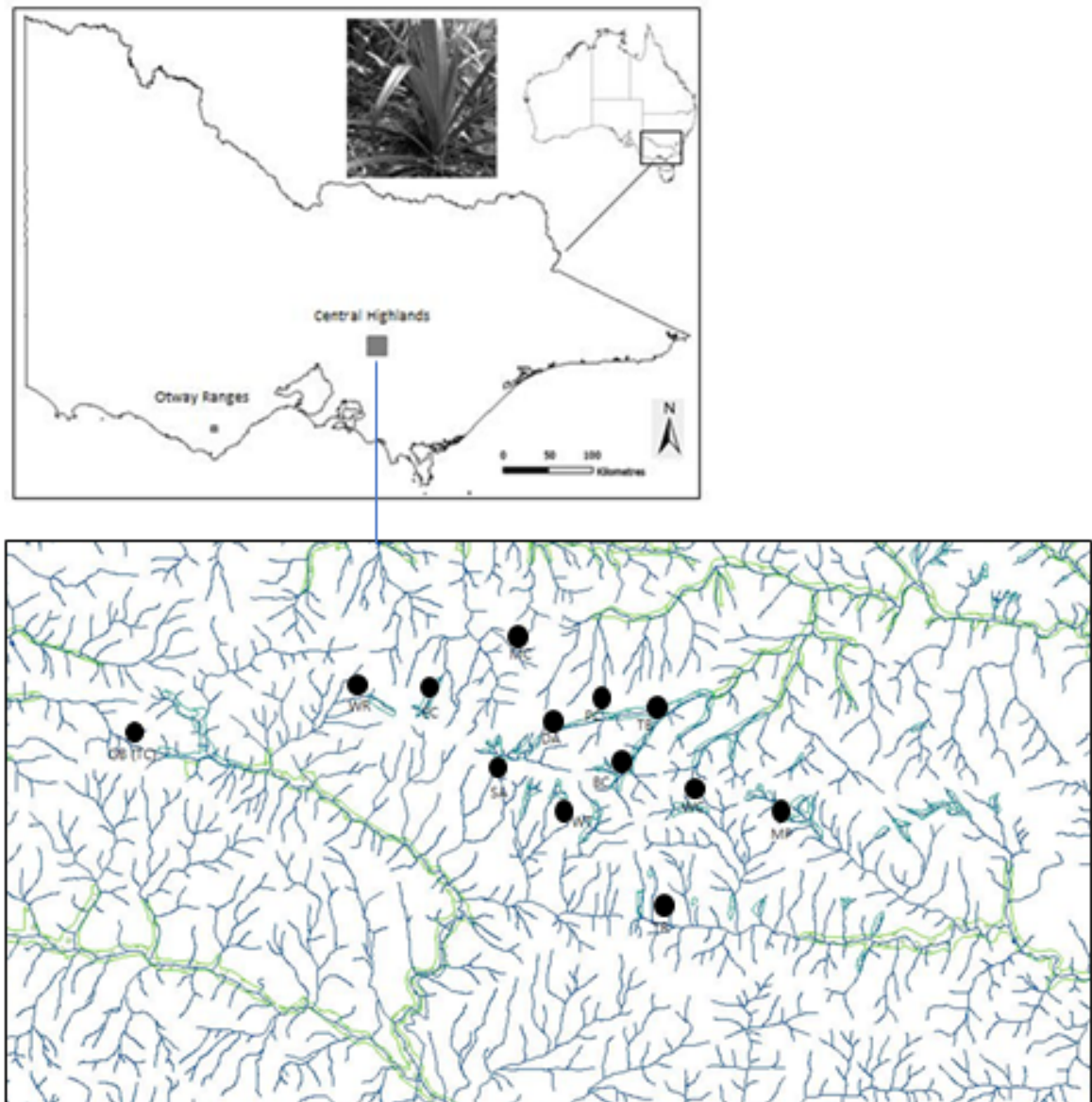


Figure 1. Map of the 13 *Astelia australiana* sites (●) in the Central Highlands region that we collected samples from for genetic analysis.

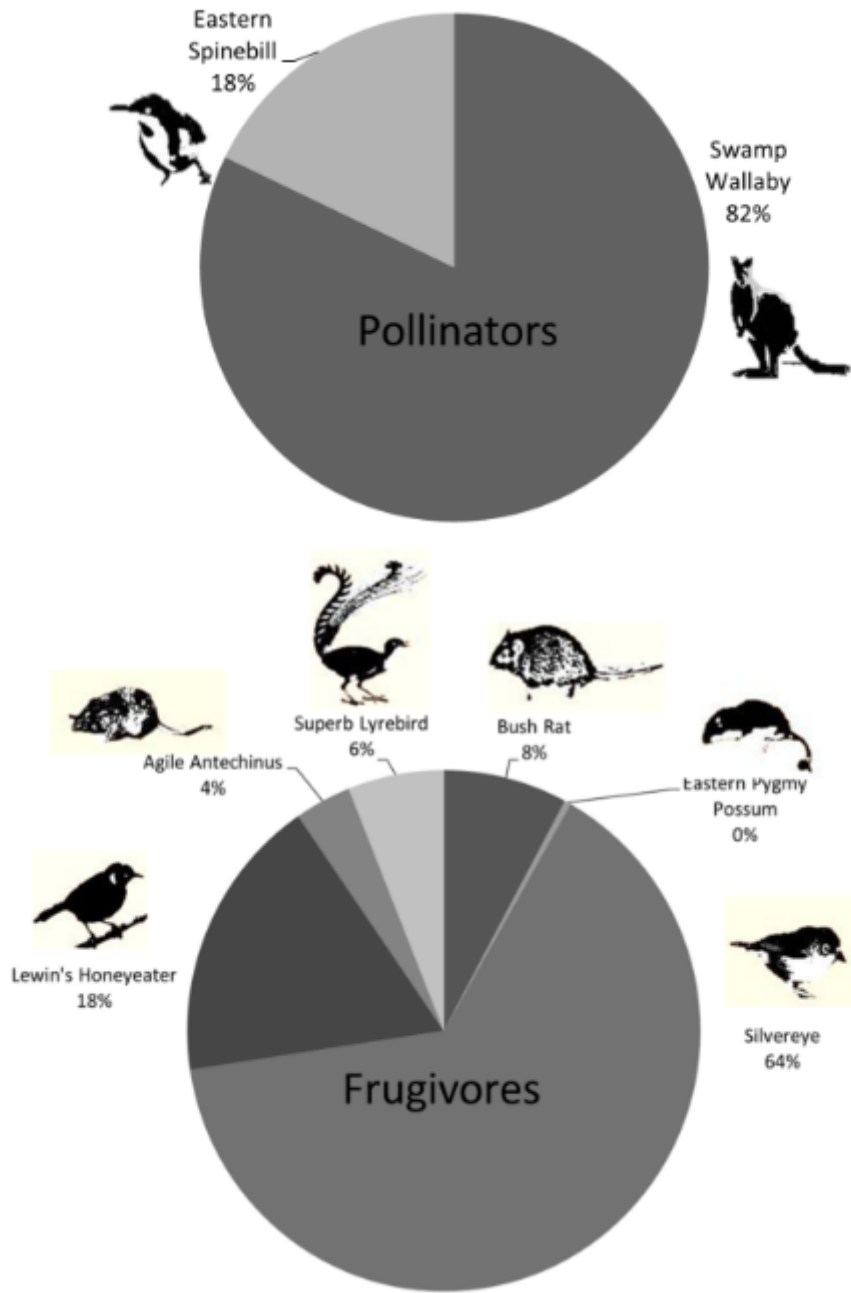


Figure 2. Visitation of *Astelia australiana* flowers from camera trap surveys separated out into pollinators and frugivores (Source: Parker 2018).



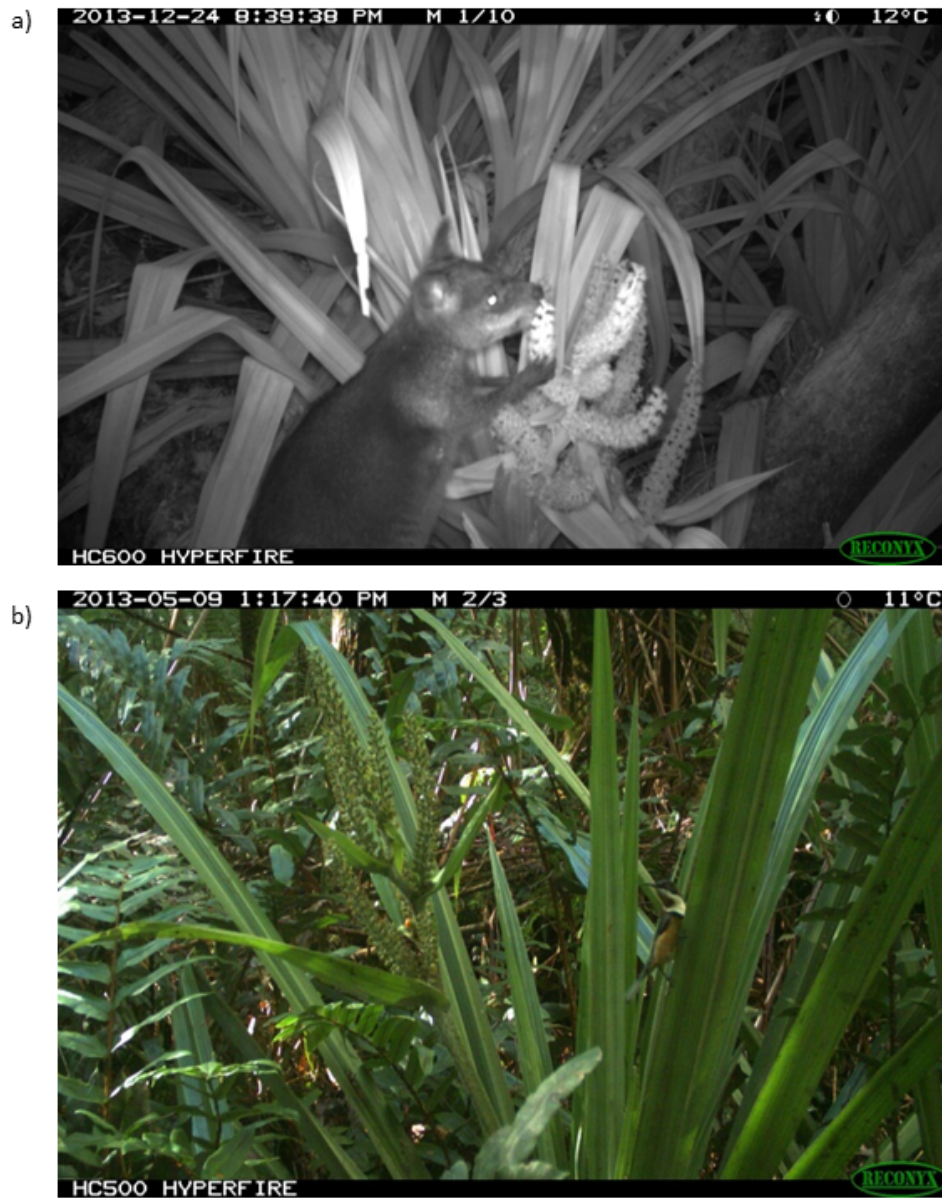


Figure 3. Visitation of *Astelia australiana* flowers by some pollinators from camera trap surveys a) Eastern Spinebill b) Swamp Wallaby (Source: Parker 2018).

a)



b)



**Figure 4. Visitation of *Astelia australiana* flowers from camera trap surveys by two of the frugivores a) Silver eyes and b) Eastern Pygmy-possum (Source: Parker 2018).**



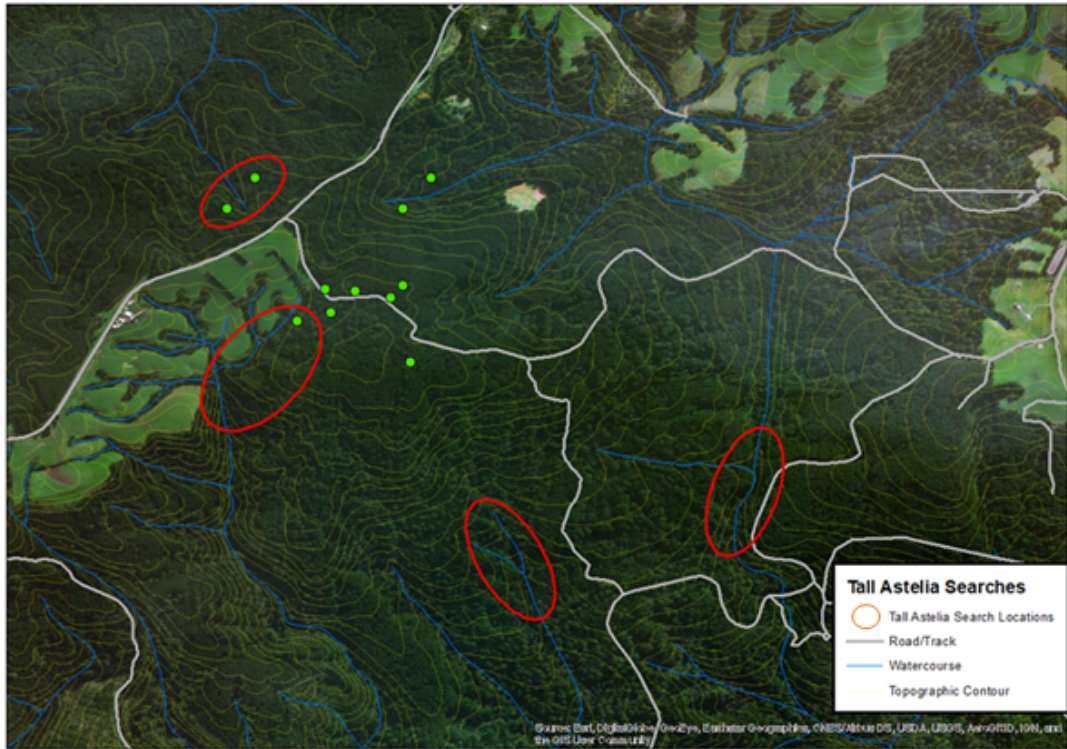
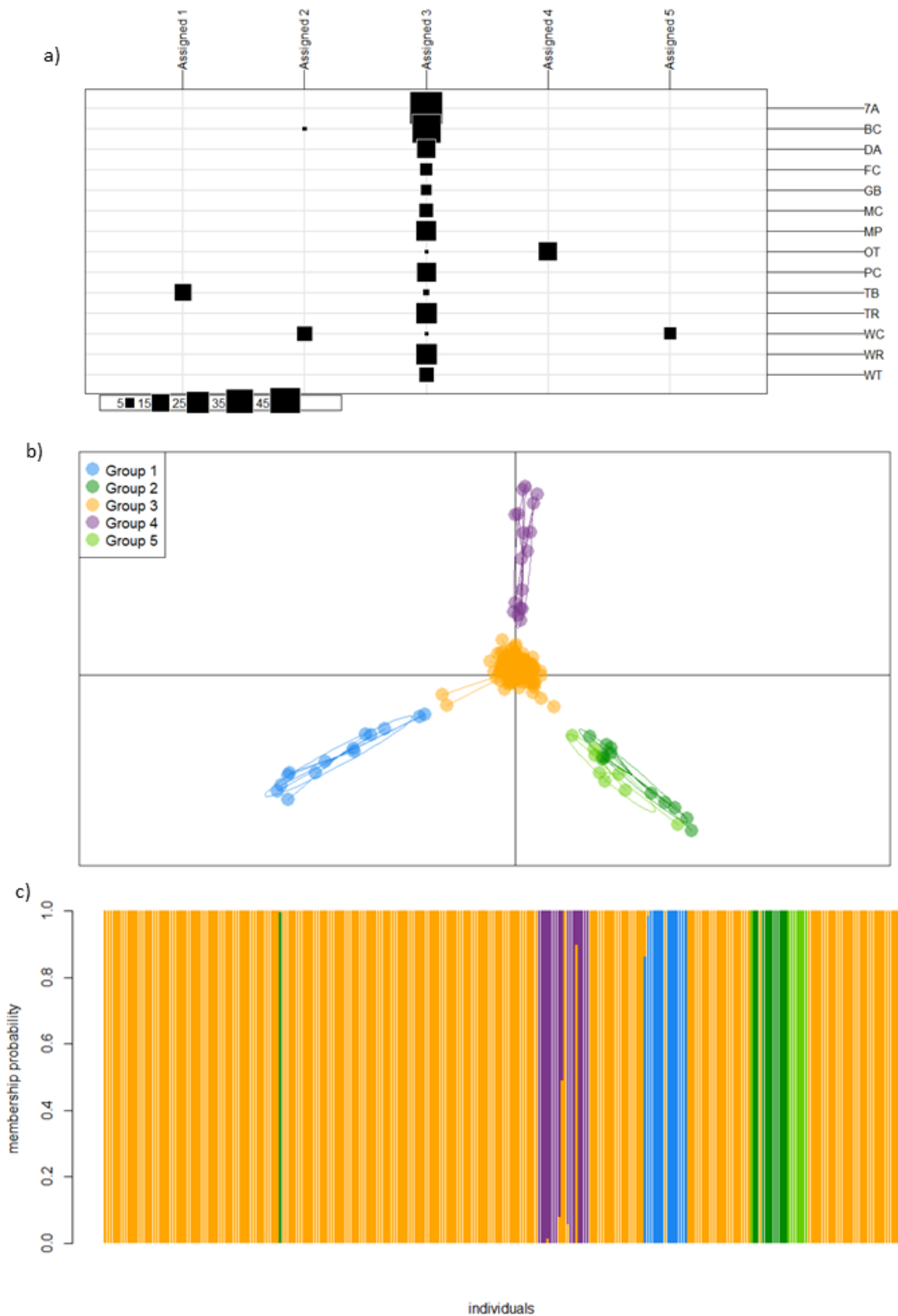
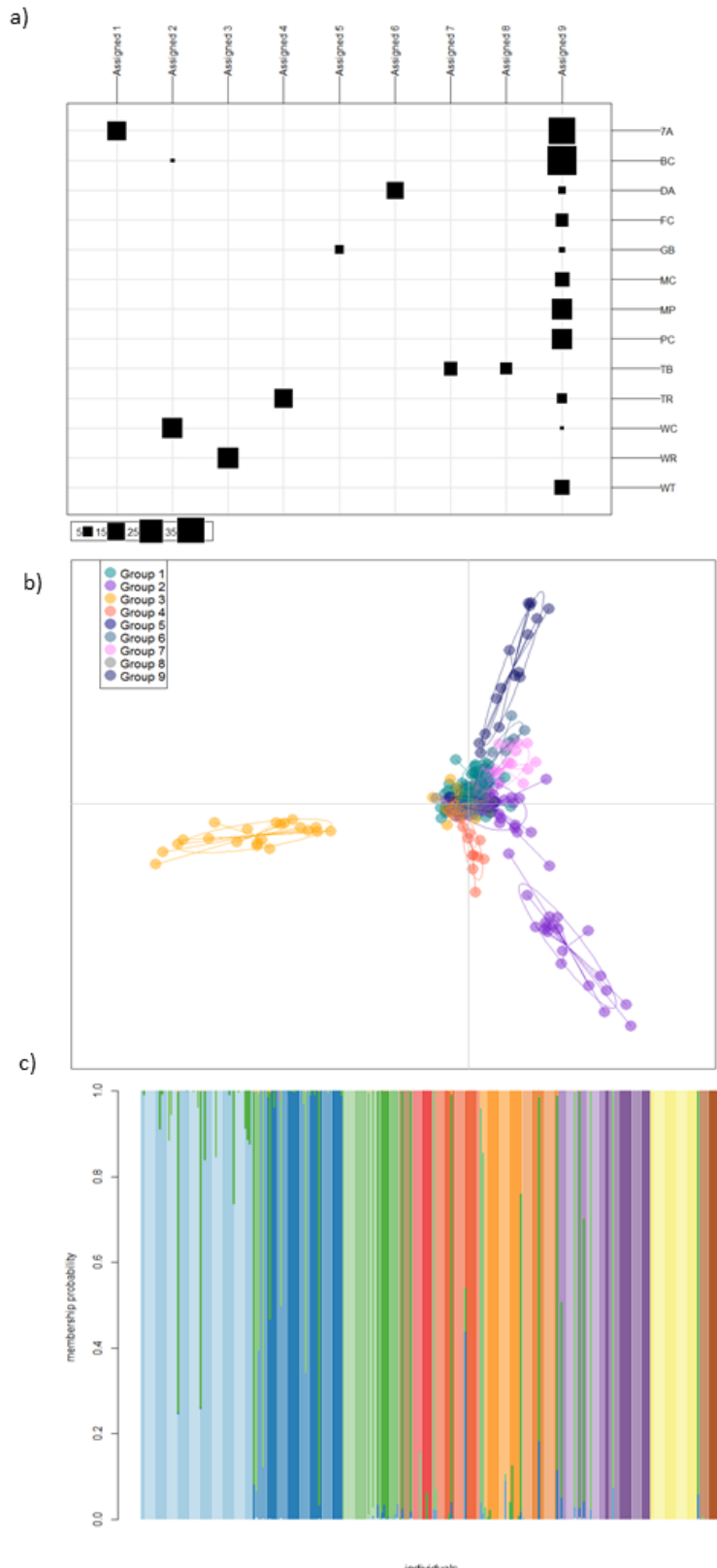


Figure 5. Map of *Astelia australiana* historical and current locations (●) in the Otway Ranges of Victoria and the areas searched to try to locate additional populations.



**Figure 6. Genetic grouping of *A. australiana* across the species range (landscape scale) based on genetic differences of individuals from RADSeq analysis showing a) the number of individuals from each site in each group; b) the differences between the five groups; c) individual proportion of membership to each group cluster.**



**Figure 7. Genetic grouping of *A. australiana* across the Central Highlands Region only based on genetic differences of individuals from RADSeq analysis showing a) the number of individuals from each site in each group; b) the differences between the five groups; c) individual proportion of membership to each group cluster.**

**Acknowledgments:**

FAME generously provided the funding for this project. Dr Jack Pascoe and Mark Le Pla from the Conservation Ecology Centre led this project from application to acquittal and assisted with the translocation and surveys for new sites in the Otway Ranges of Victoria. Dr Michael Amor and Dr Elizabeth James from the Royal Botanic Gardens Melbourne conducted the genetic analysis of *A. australiana*. Associate Professor Craig Nitschke and Linda Parker from The University of Melbourne conducted field work and provided advice and support.

**Reference:**

Parker, L. M. (2018). Aspects of the ecology of *Astelia australiana* (Tall Astelia). PhD Thesis. School of Ecosystem and Forest Sciences. The University of Melbourne, Australia.