Epiphytes in Forest Remnants:
How are they faring?

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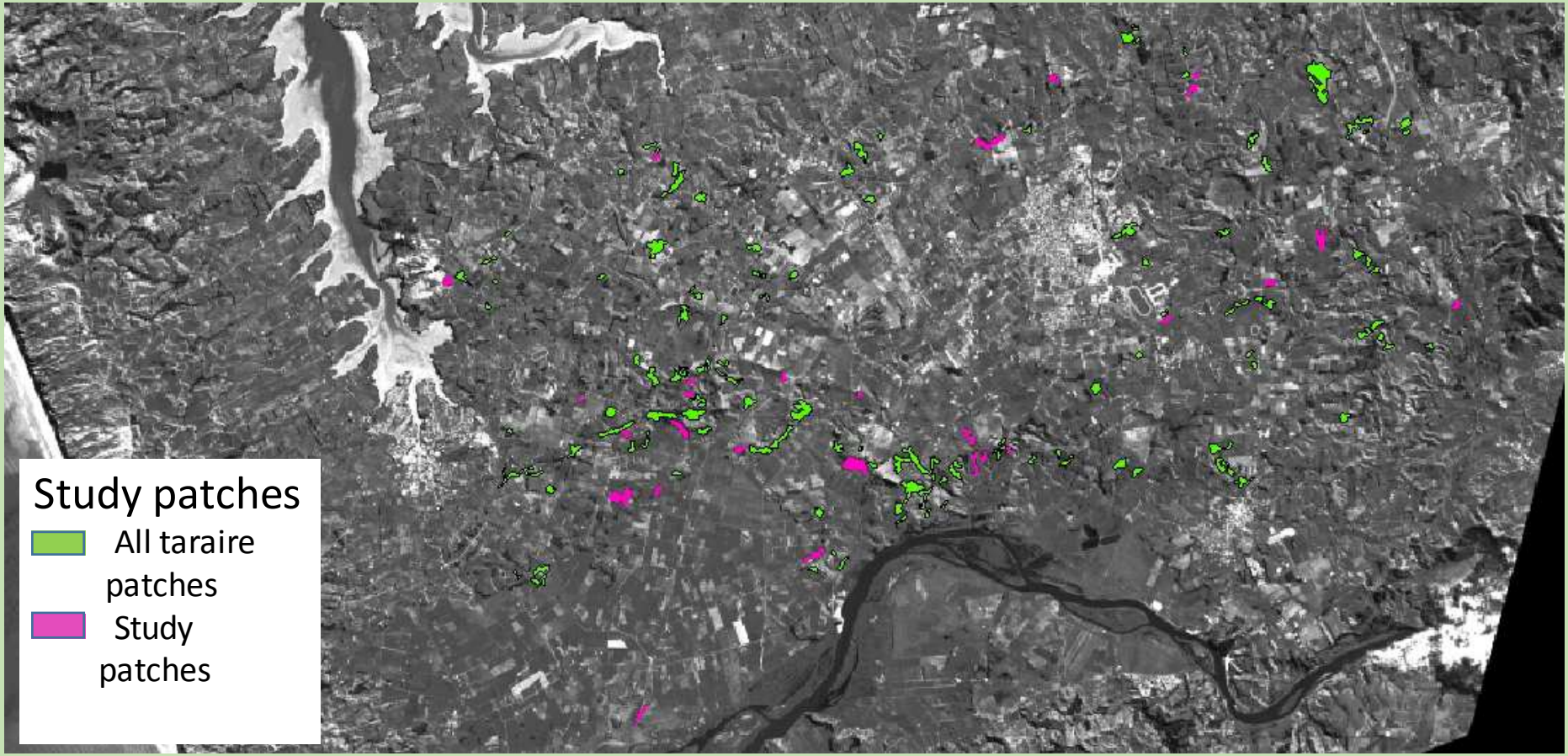
MSc Thesis: Which spatial or ecological attributes of forest fragments most strongly influence their plant species richness?

- 36 forest patches selected from a total of 165 taraire (*Beilschmiedia tarairi*) –dominant forest remnants In the Manukau Ecological District
- Size range 0.7 – 13 ha = representative of the range of sizes of all taraire remnants in the E.D.
- A measure of connectivity was developed to describe the relative connectivity/isolation of each patch using tools in ARC GIS. Four classes of connectivity from most isolated to most connected.
- All vascular plant species in each remnant were recorded using a walking transect to assess as many plant habitats as possible.
- Abundance of each species was estimated in four categories from “rare” to “abundant”(1 -4)
- Species were grouped as “canopy”, “understorey”, “groundcover”, “lianes and vines” and “epiphytes”.

Taraire forest patches in the Manukau Ecological District



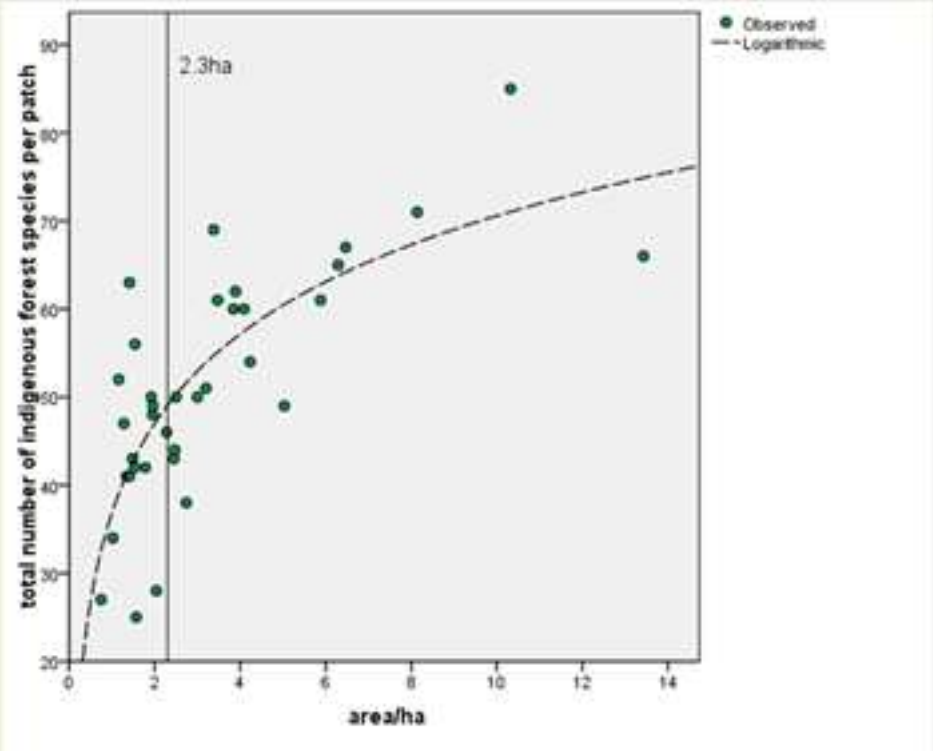
Fencing effects

Other patch attributes examined

- Edge effects – Patton shape index – measures the length of the edge relative to patch area.
- Number of plant habitats in the patch – e.g. riparian, gully bottom, wetland, rock faces etc.
- Land contour – hilly patches had more complex topography offering a greater range of plant habitats
- Recovery time since fencing from livestock

Results: total species richness and area

Plant guild	Total species	Species per patch
Canopy trees	19	Range: 7 – 15, M= 10.6
Understorey shrubs	43	Range: 2 – 18, M= 10.6
Groundcover species	59	Range: 5 – 33, M= 17
Lianes and vines	11	Range: 2 – 9, M= 5.3
Epiphytes	15	Range: 1 – 13, M= 6.2
Infrequent species	48	Range: 0 – 15, M= 2.4
Exotic species	65	Range: 3 – 19, M= 8.4
Total indigenous species	151	Range: 26 – 83, M=51



Species of epiphytes and climbers recorded

Epiphytes

Common name	Botanical name
Tank lily	Astelia hastata
Perching lily	Astelia solandri
Hounds tongue fern	Microsorum pustulatum
Sickle spleenwort	Asplenium polyodon
Hanging spleenwort	Asplenium flaccidum
Bamboo orchid	Earina mucronata
Leather fern	Pyrrosia eleagnifolia
Bristle ferns	Trichomanes elongatum Trichomanes venosum
Easter orchid	Earina autumnalis
Fork ferns	Tmesipteris lanceolata Tmesipteris elongata Tmesipteris tannensis
Tawhiri karo	Pittosporum cornifolium
clubmoss	Phlegmariurus varius

Vines and lianes

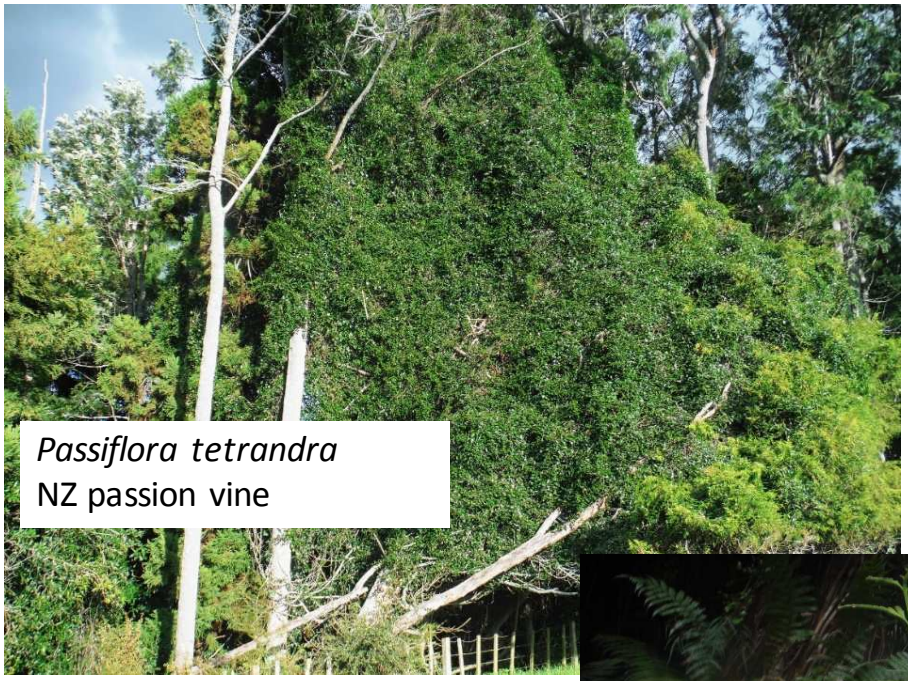
Common name	Botanical name
Supplejack	Ripogonum scandens
Pohuehue	Muehlenbeckia australis
Small white rata	Metrosideros perforata
White rata	Metrosideros diffusa
NZ jasmine	Parsonsia heterophylla
NZ passion vine	Passiflora tetrandra
Kiekie	Freycinetia banksii
Rata	Metrosideros fulgens
Puka	Griselinia lucida
Clematis	Clematis sp.
Carmine rata	Metrosideros carminea

NB some plants that are normally epiphytic in contiguous forest were present but were primarily ground cover plants in the forest patches especially *Blechnum filiforme* and *Microsorum scandens.*

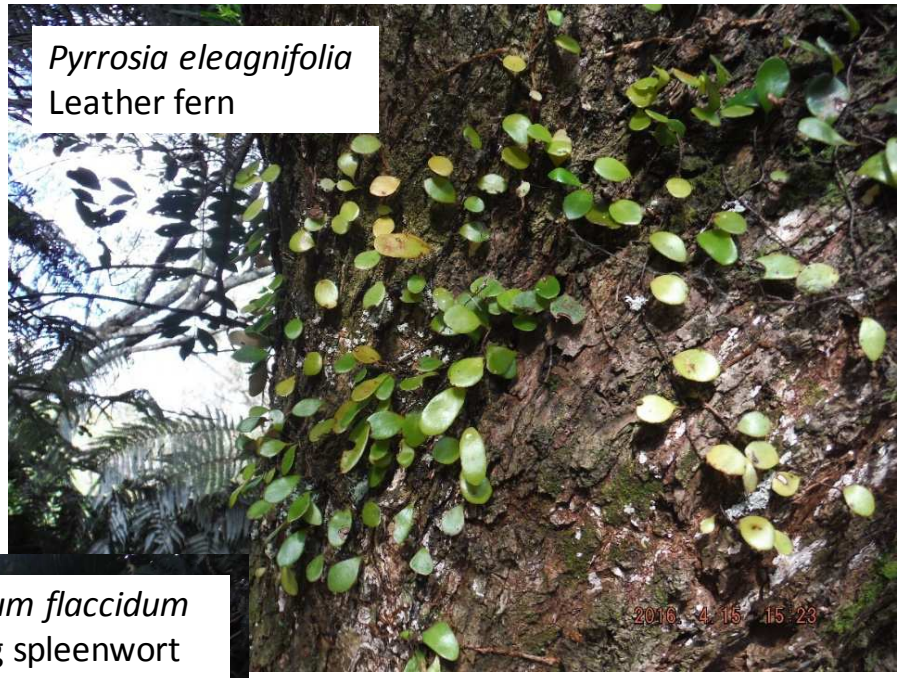
Epiphytes and climbers

Species area relationship	N	R^2	ANOVA F value
Log area vs number of canopy species	36	0.193	8.128 p= 0.007
Log area vs number of understorey shrub species	36	0.467	29.80 p= .000
Log area vs number of groundcover plant species	36	0.325	16.38 p= .000
Log area vs number of liane & vine species	36	0.336	17.19 p= .000
Log area vs number of epiphyte species	36	0.43	25.6 p= .000
Log area vs infrequent species	36	0.370	19.99 p= .000
Log area vs exotic species	35	0.161	6.544 P= .015

- A strong positive relationship between species richness and area for epiphytes and climbers.
- A weak relationship between connectivity and species richness for epiphytic species only.
- No clear relationship between recovery time and species richness for any plant guild (confounding factors*).
- Statistically significant positive relationship between species richness of epiphytes and climbers and the edge environment – many species favour the edge.
- Number of plant habitats and topography were not statistically significant except for ground cover species – further investigation required**.



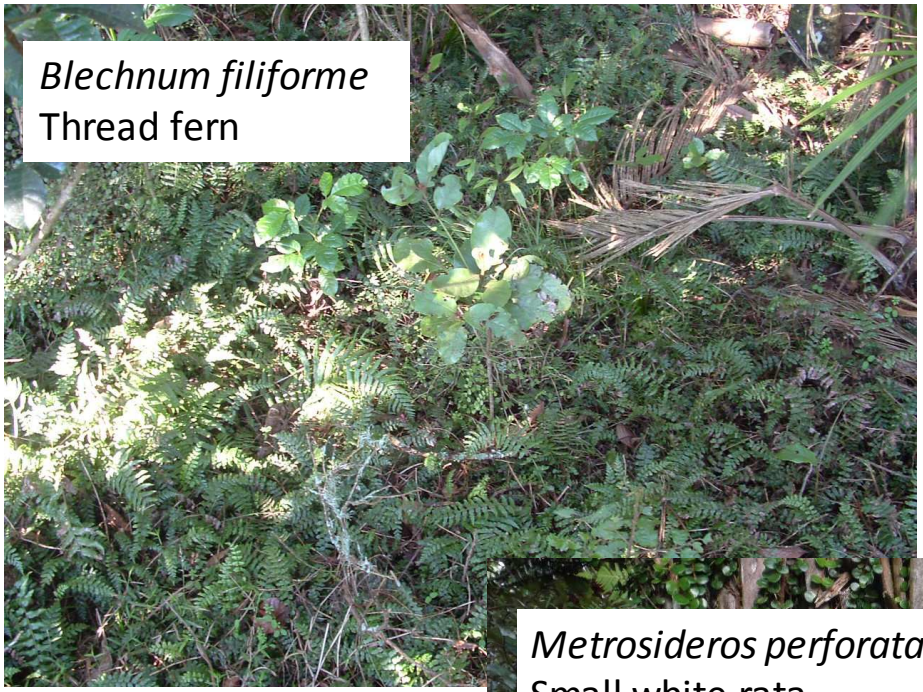
Passiflora tetrandra
NZ passion vine



Pyrrosia eleagnifolia
Leather fern

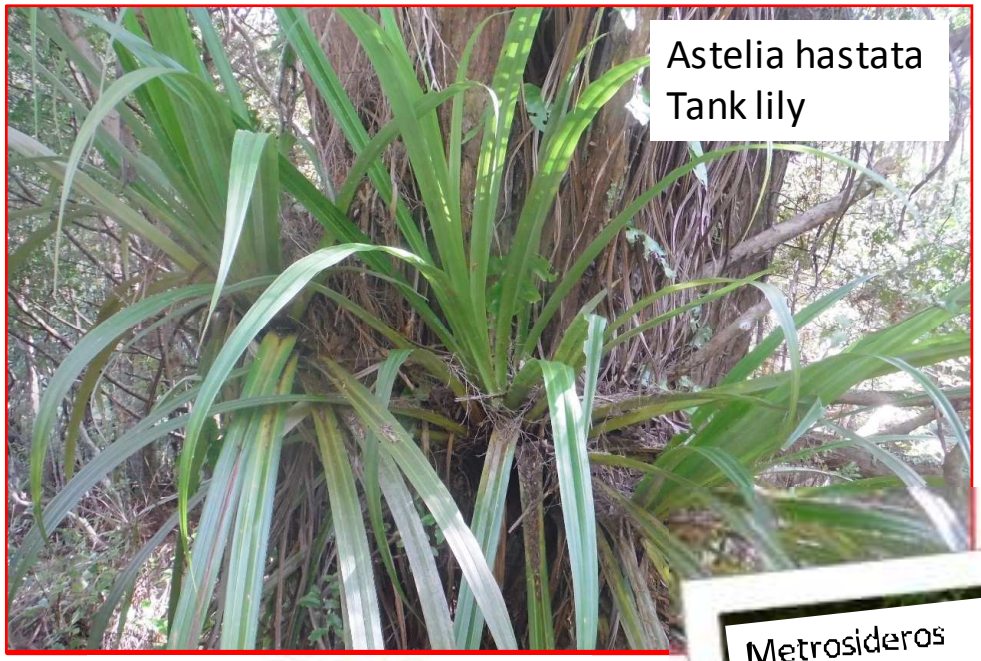
Asplenium flaccidum
Hanging spleenwort

Earina mucronata
Bamboo orchid



Blechnum filiforme
Thread fern

Metrosideros perforata
Small white rata

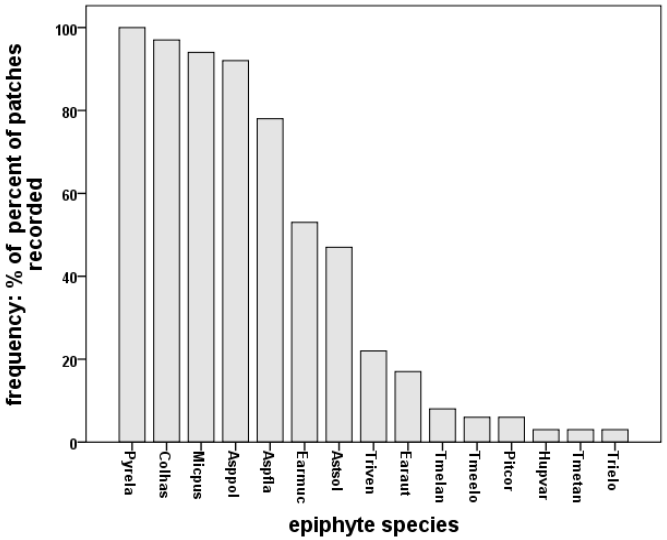

Astelia hastata
Tank lily


Metrosideros
fulgens

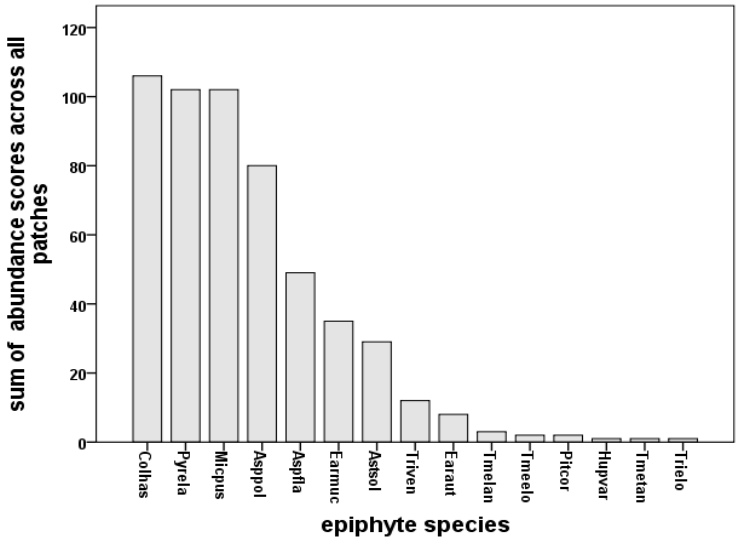
Metrosideros
diffusa: white rata

Epiphyte community composition

Frequency



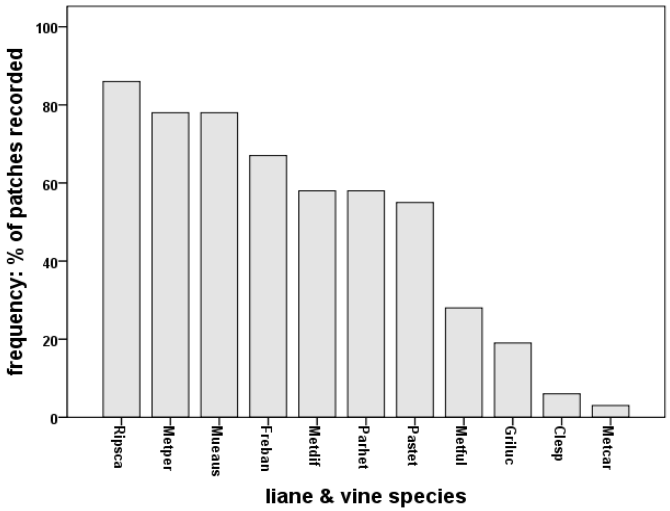
Abundance



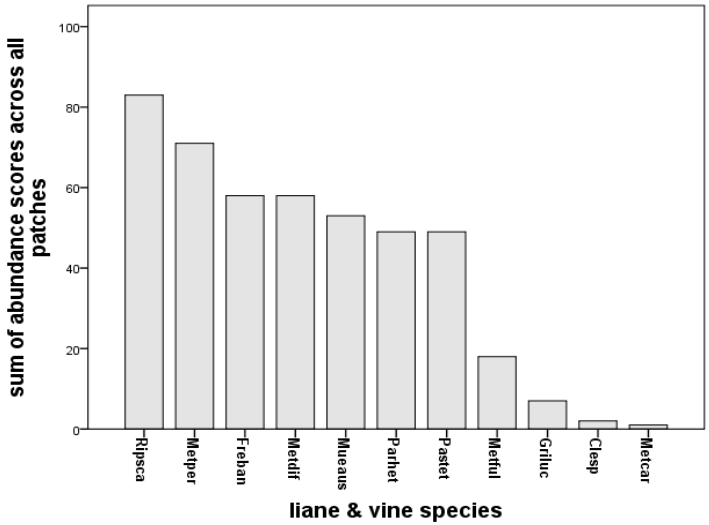
- Some species found almost universally – leather fern, tank lily, hound's tongue fern, sickle spleenwort. These 4 species were also the most abundant.
- Others found only in 1 or 2 patches – fork fern species, Pittosporum cornifolium, clubmoss.
- Some species such as thread fern, fragrant fern, mangemange and jointed fern that are normally epiphytes were more often found sprawling over the forest floor than behaving as epiphytes.

Liane and vine species

Frequency



Abundance



- Supplejack, small white rata, pohuehue and kiekie were most common, occuring in 70 -80% of remnants.
- The two species of white rata, supplejack and kiekie were the most abundant.
- Some of the lianes and vines were large and extensive e.g passion vine.
- Carmine rata has a conservation rating of “Regionally at risk - Sparse” in the Auckland Region

Conclusions

1. Small forest remnants provide habitat for a range of epiphytes and climbers.

2. Larger patches hold more species of all plant guilds.

3. Patch connectivity may exert a weak effect for epiphytes.

4. The forest remnants studied conformed to the Species Area Relationship (SAR) but appeared largely unaffected by relative isolation in this landscape.

5. Patch edges and the generally lighter conditions within small forest remnants may favour some light demanding epiphytes and climbers such as Metrosideros species, NZ passion vine etc.

6. Some plants that are normally epiphytes are frequently found as ground cover species in forest remnants e.g fragrant fern and thread fern. The lighter conditions in small remnants may account for this.

7. No statistically significant relationship between recovery time (since fencing) and plant diversity. Do many native species fail to re-colonise patches once they go extinct in a particular patch?

References

Auckland Regional Council (2004): Awhitu and Manukau Ecological Districts: Indigenous Vegetation Survey. Volume 1

Stanley, R.; de Lange, P.; and Cameron, E.K. (2005). Auckland Regional Threatened and Uncommon Plants List. *Auckland Botanical Society Journal*, 60, (2): 5.

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