Landcare Research
Manaaki Whenua

Sustained recovery of native vegetation following successful biocontrol of mist flower

Simon Fowler, Jane Barton, Chris Winks, Alison Gianotti, Guy Forrester

- Mist flower in NZ – issues and biocontrol agents
- Monitoring results of 1998-2003[1] plus some 2008 updates (unpublished)

[1]Barton, J., Fowler, S. V., Gianotti, A. F., Winks, C. J., Beurs, M. d., Arnold, G. C., Forrester, G., 2007. Successful biological control of mist flower (*Ageratina riparia*) in New Zealand: Agent establishment, impact and benefits to the native flora. *Biological Control* 40, 370-385.

Mist flower, *Ageratina riparia* (Asteraceae) in New Zealand

- Introduced into New Zealand as an garden ornamental in the 1930s

- Escaped to become a weed of forests, river systems and disturbed sites in northern parts of North Island

Mist flower biodiversity issues


Riparian zone in forest

- Risk of local/national plant extinctions
- Threatening bryophyte communities
- Sedimentation: encouraging further weed invasion (e.g. wild ginger)
- Herbicides (or hand-pulling): high risk to indigenous vegetation

Mist flower biocontrol agents

- Two biocontrol agents mainly responsible for suppression of mist flower in Hawaii (1970s)

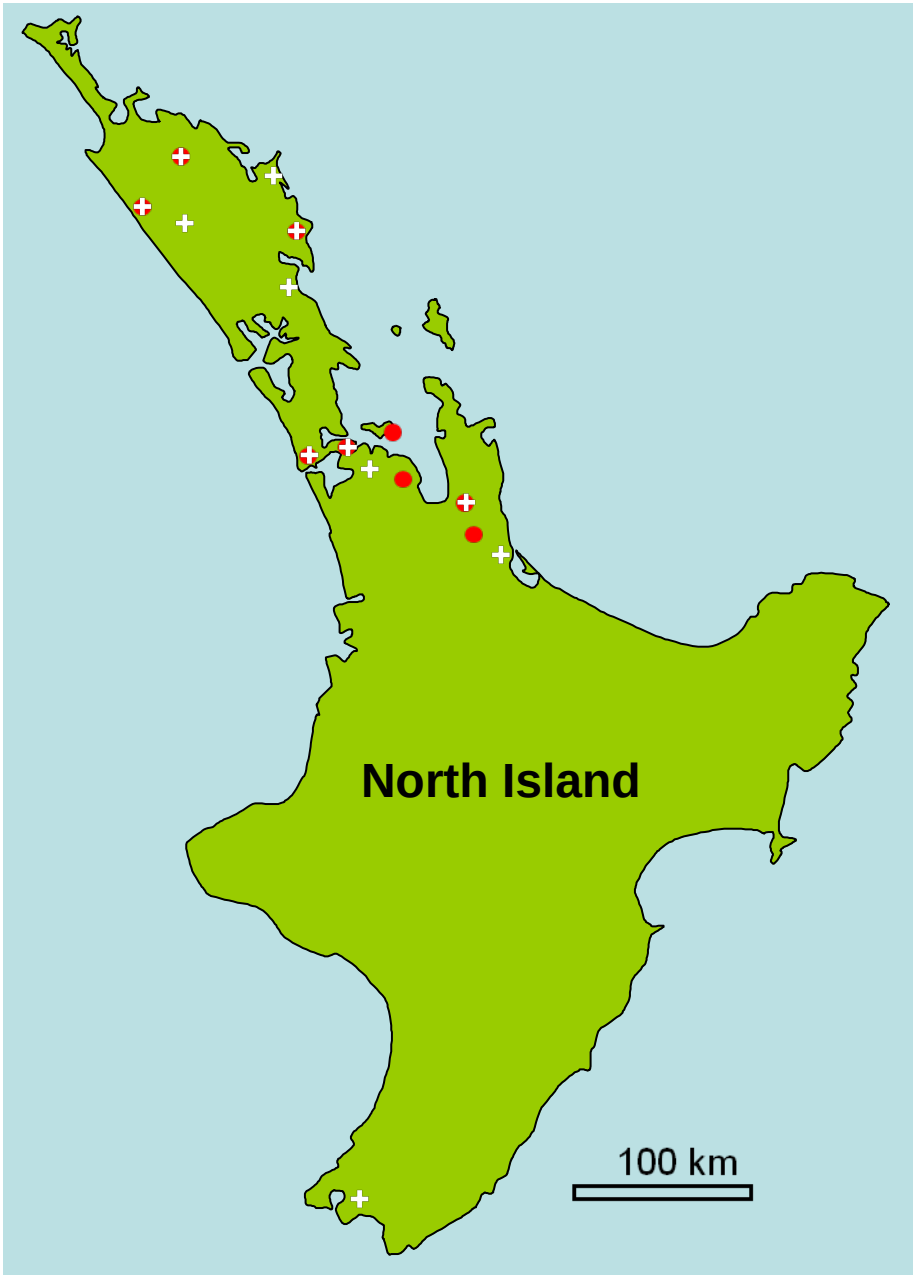

White smut fungus,
Entyloma ageratinae


Gall fly,
Procecidochares alani

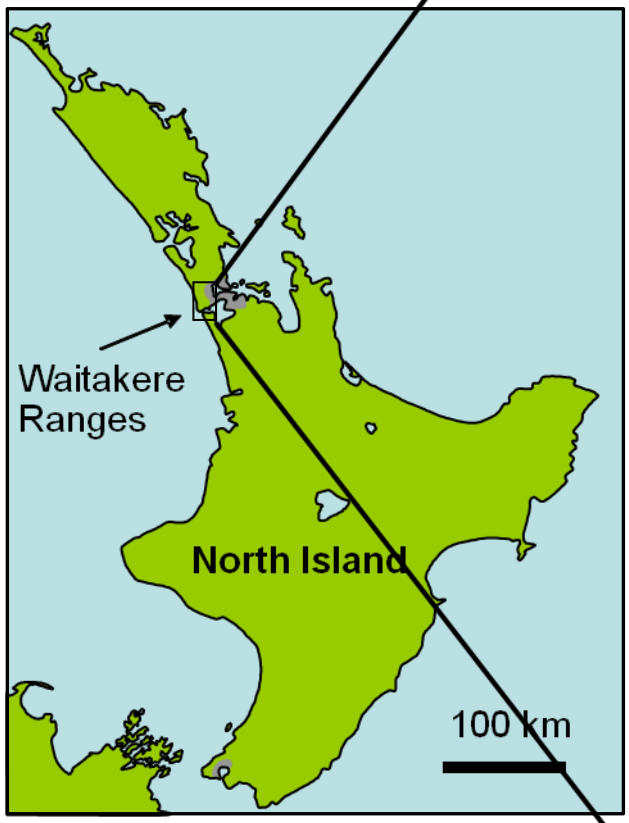
- Fungus released in NZ 1998; gall fly released 2001

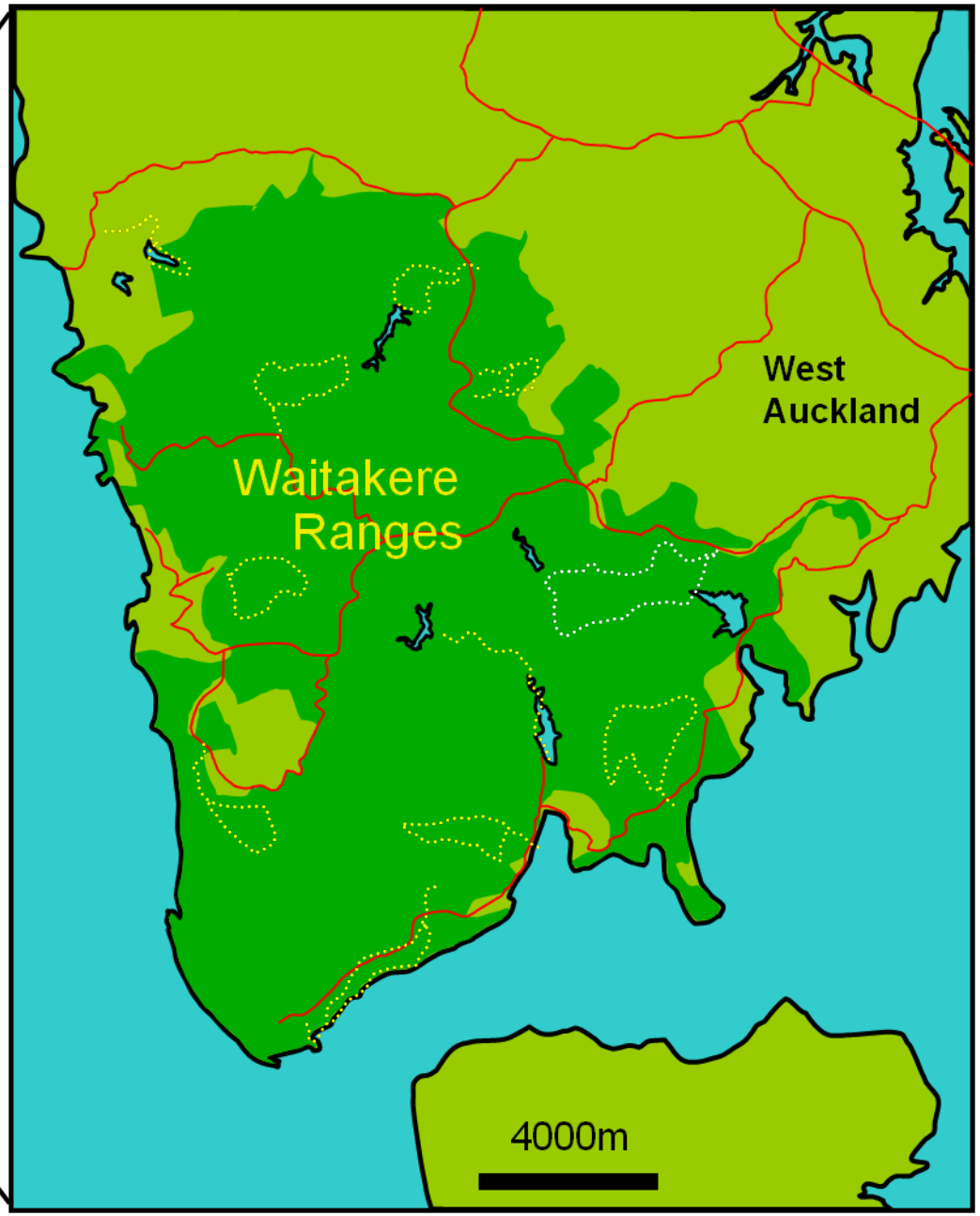
Agent establishment

- Mist flower fungus established at all 9 initial release sites ●
- Gall fly recovered at 16 of 34 sites +



Main study area: Waitakere Ranges





Waitakere Ranges tour

Monitoring methods in brief[1]

[1]details: Barton et al 2007

1/ Agent damage/weed infestation:

i) Randomly selected plots along 11 walking tracks in Waitakere Ranges: 110 plots, each 10x50m

ii) Fungus release sites throughout northern North Island

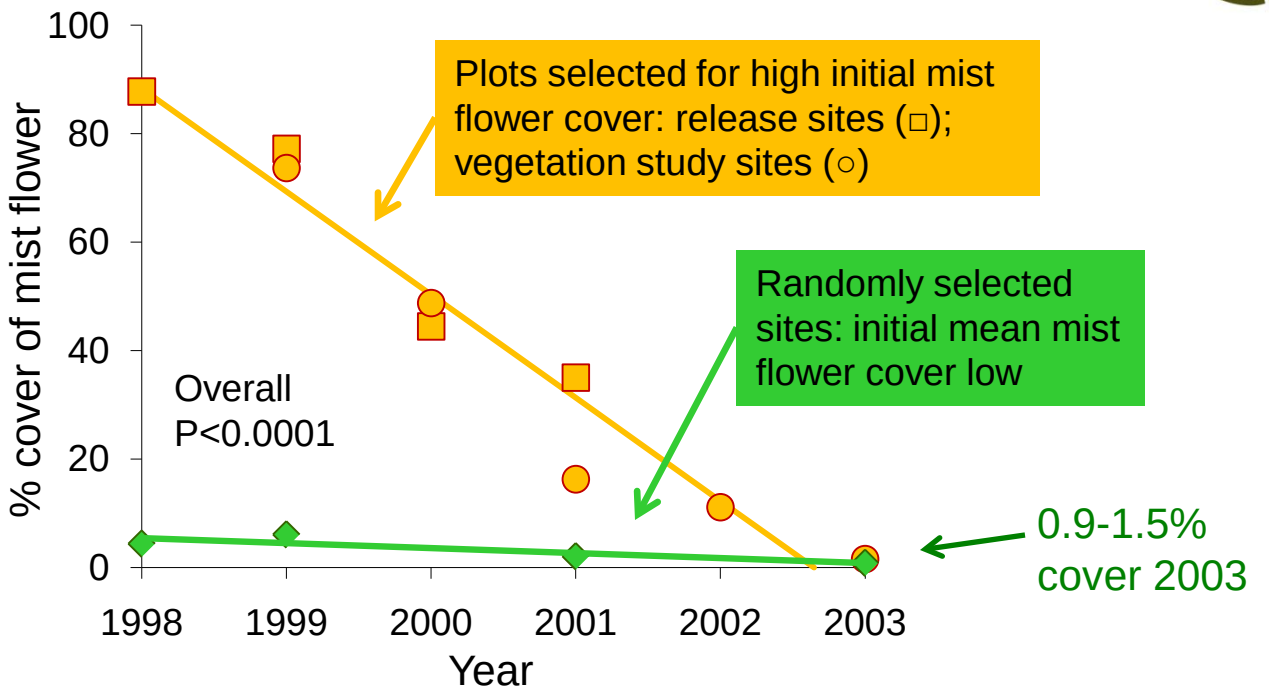
2/ Recovery of indigenous vegetation: 20 paired weed presence/absence plots (each $4m^2$) also in Waitakeres

Sampled 1999-2003

Limited re-sampling 2008

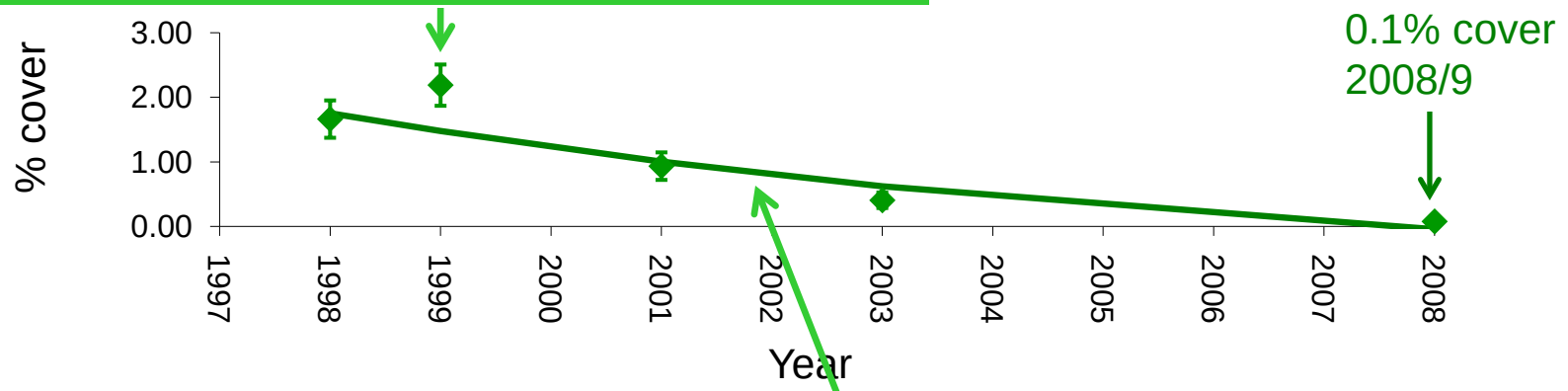
Vegetation recovery plots not suitable for re-sampling (track edges get intermittently disturbed)

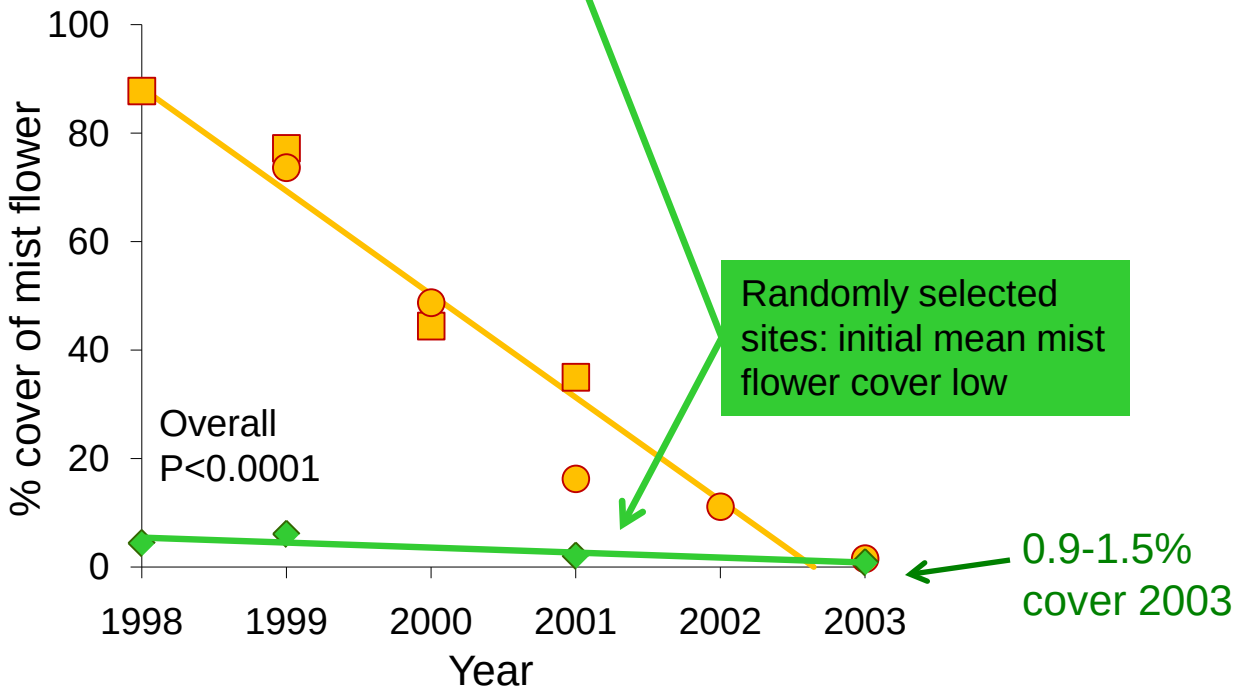
Mist flower decline in % cover



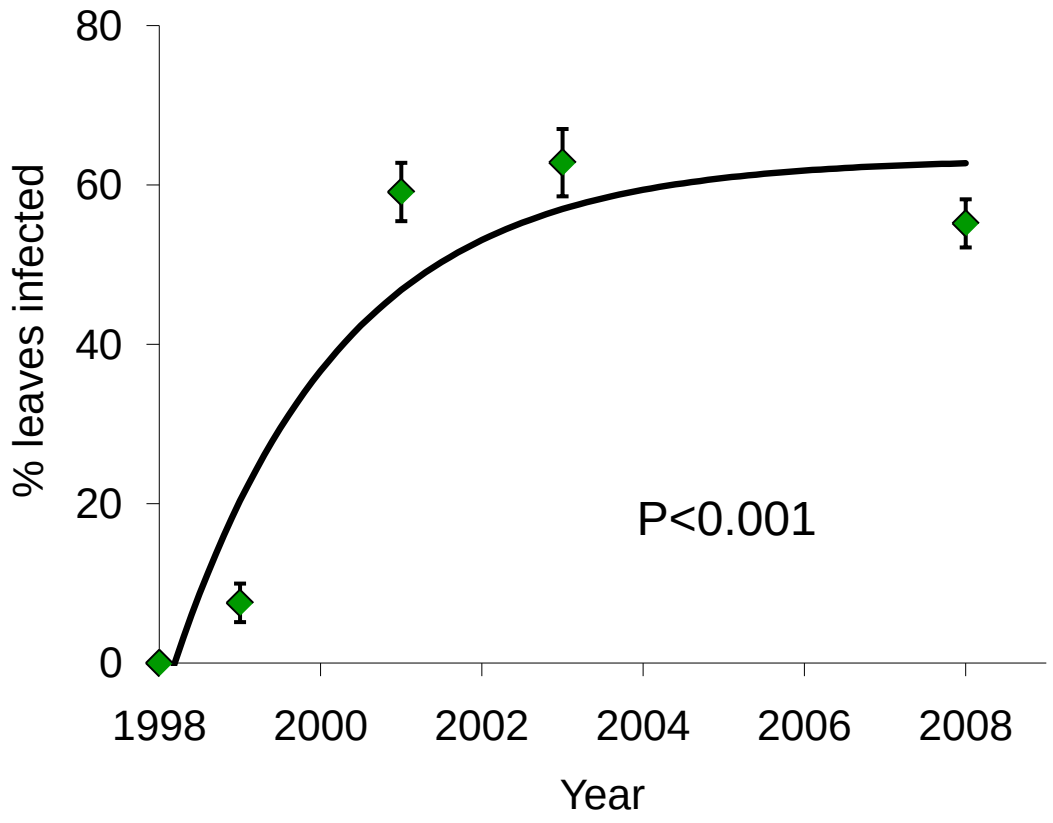
Mist flower decline in % cover

Fungus colonised plots but infection levels low

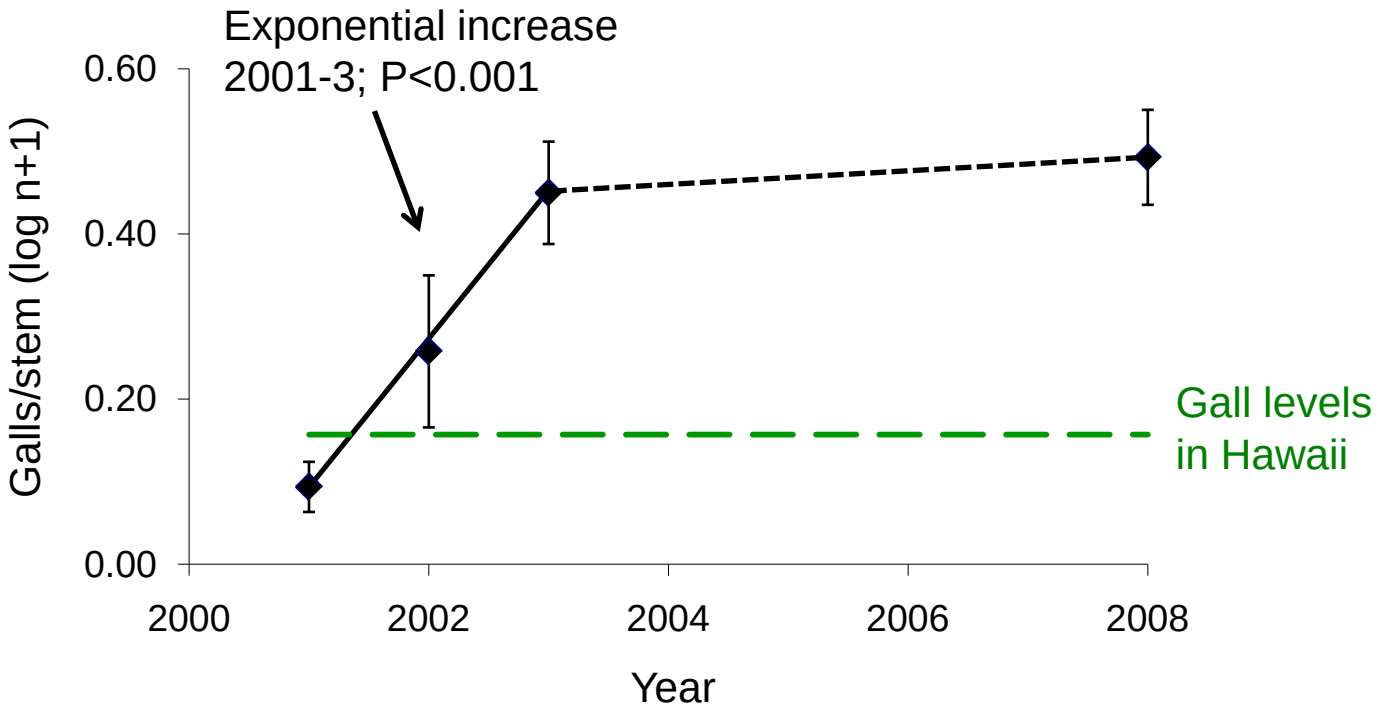




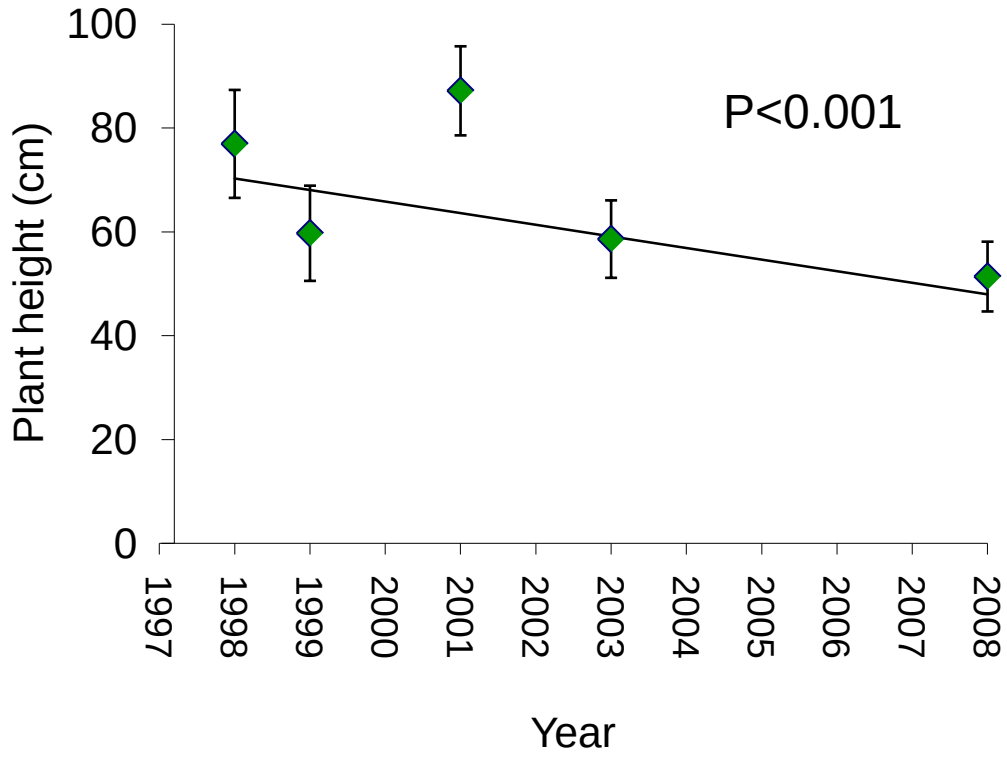
Mist flower fungus infection levels



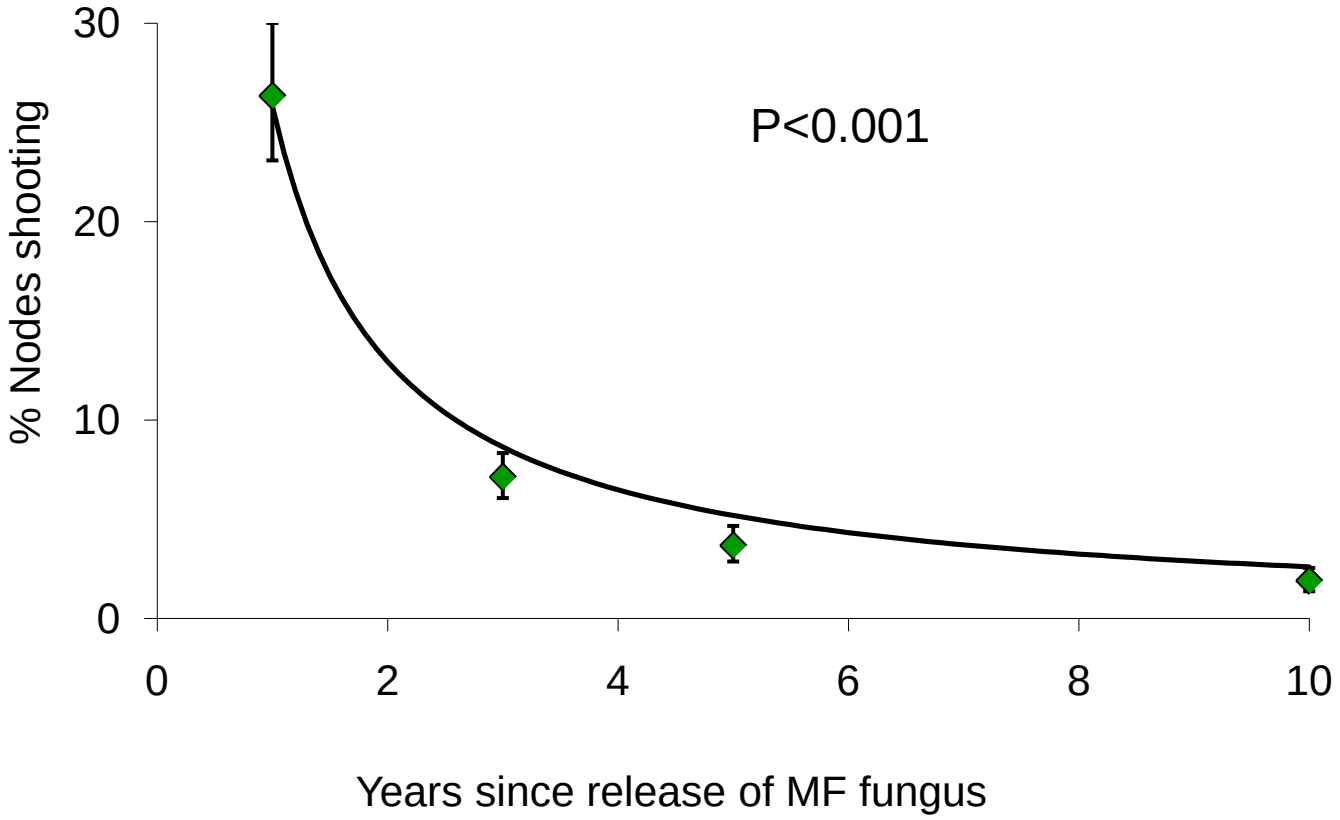
Mist flower gall fly infestation levels



Reduction in plant vigour: height



Reduction in plant vigour: growth from nodes

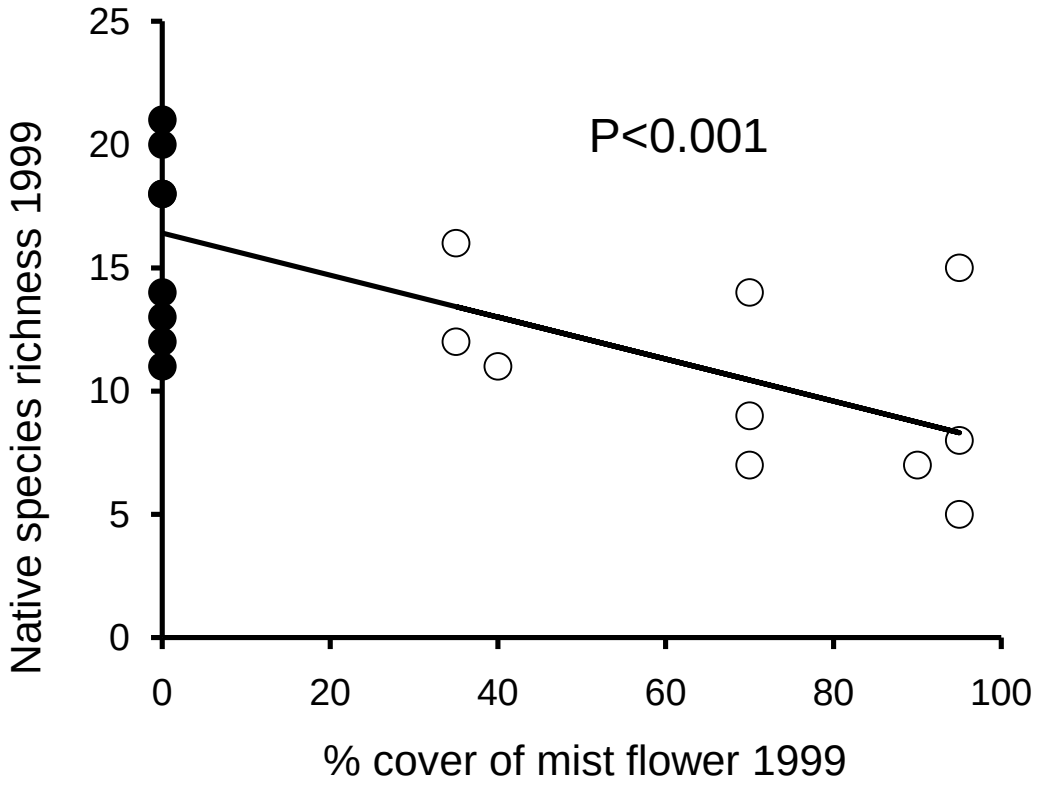


Summary of mist flower/agent status

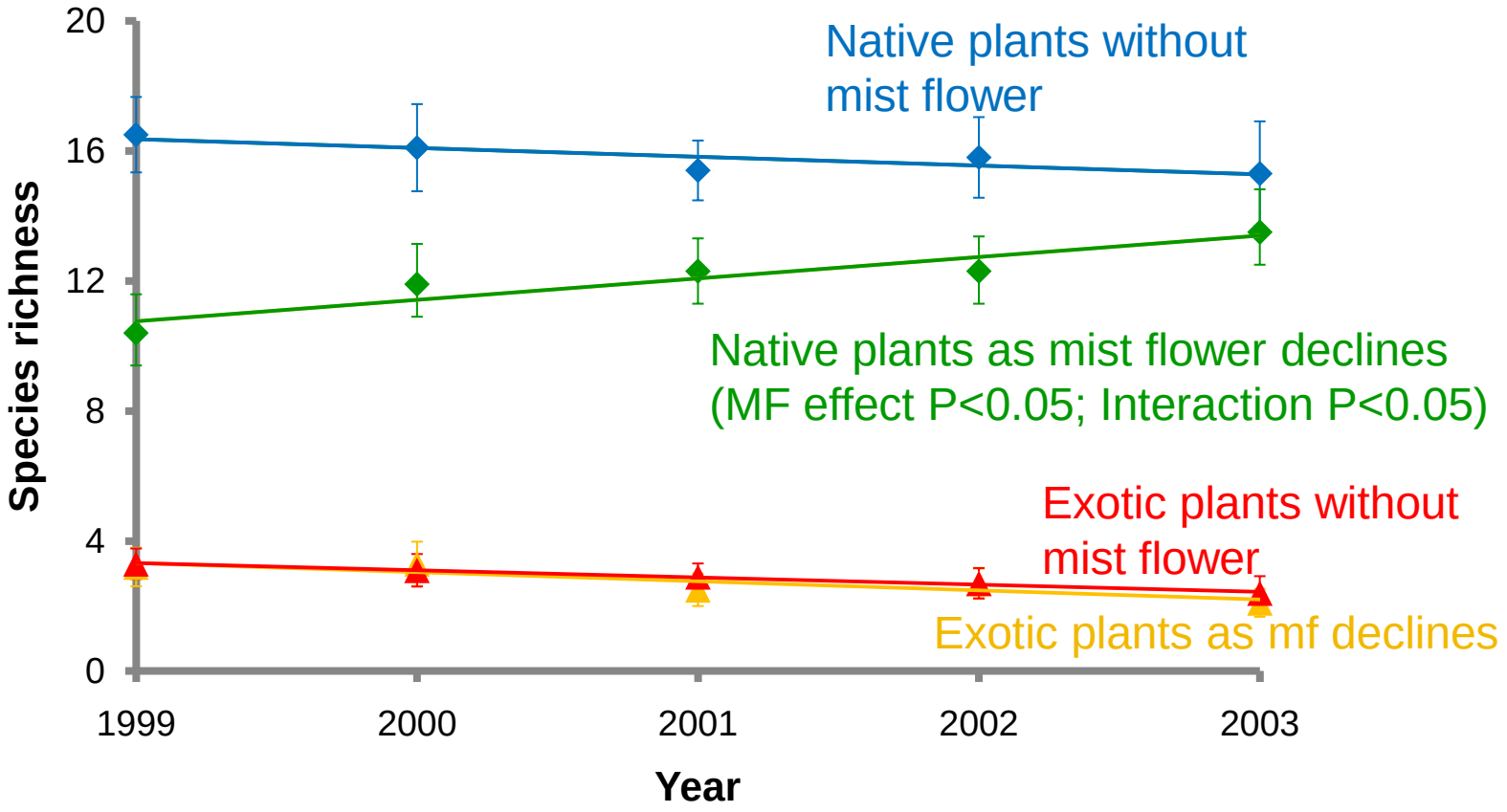
- By 2008, mist flower % cover declined still further (0.1%) in Waitakere plots
- Both agents maintaining high levels of attack: 55% leaves infected by fungus; mean 2.3 galls/stem
- Plant height reduced and dramatically reduced branching from nodes

Recovery of native plant species

- At the start - negative relationship between native species richness and % cover of mist flower



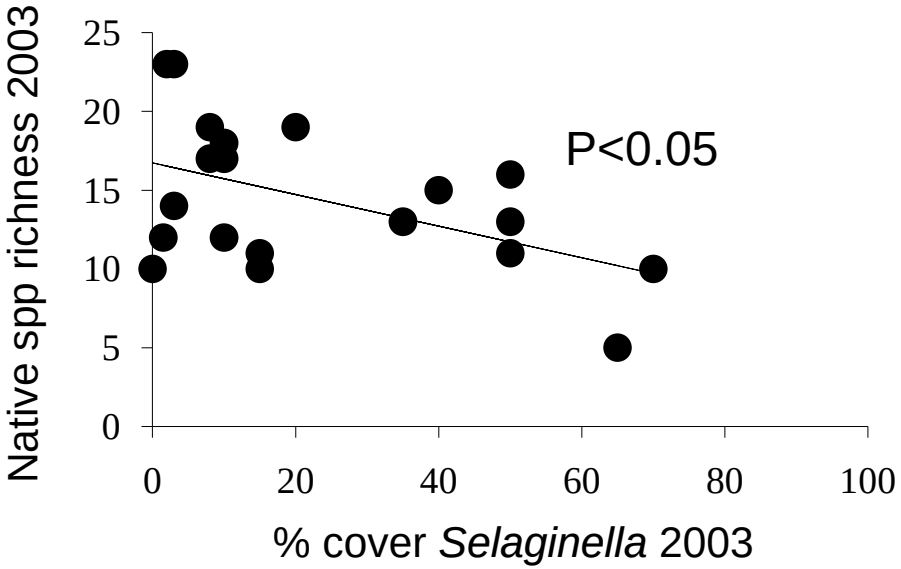
Recovery of native plant species



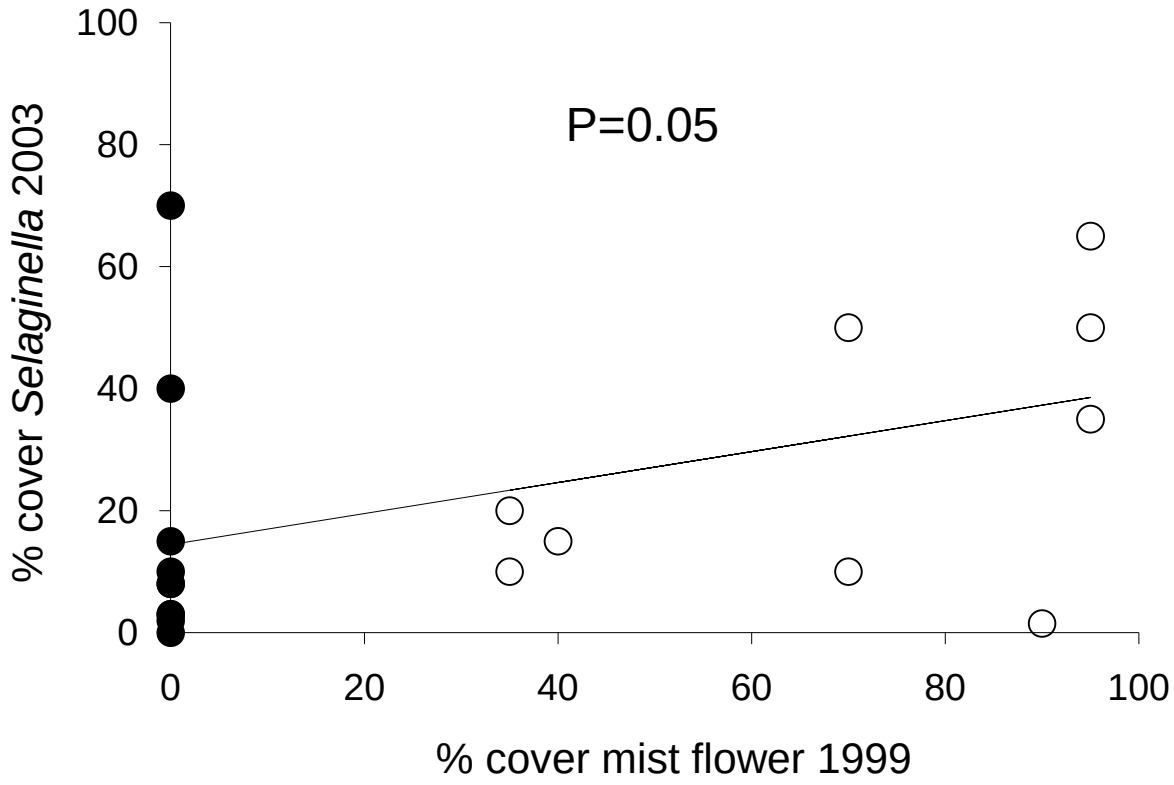
- Natives recorded often as very young plants, but included important mid-late successional species

Replacement weeds?

- Only one common exotic species, African club moss (*Selaginella kraussiana*)
- Concern that it could replace mist flower as the target was suppressed



Replacement weed?



- Only a weak trend of *Selaginella kraussiana* preferentially invading plots where mist flower decline had occurred

Additional, anecdotal evidence of benefit to natives from biocontrol of mist flower

- Two *Hebe* spp., endemic to New Zealand and considered ‘vulnerable’ to extinction, have had their conservation status improve due to a recent decline in mist flower cover in their habitat (P. de Lange, Department of Conservation, pers. comm.)

Monitoring mist flower biocontrol in in New Zealand - Conclusions

- In at least one area (the Waitakere Ranges) there was recovery of native plant species diversity after mist flower decline, and no sign of invasion by new exotic species
- However, there was a weak trend for African clubmoss (*Selaginella kraussiana*) to preferentially invade plots in which mist flower had declined
- 2008 updates show 1/ mist flower % cover has declined still further; 2/ biocontrol agent abundance remains high; 3/ declines in plant height and branching from nodes
- Mist flower appears to be under sustained, fully successful biological control in New Zealand, with demonstrated benefits to biodiversity

Mist flower 1999

Mist flower 2002

Acknowledgements

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