Landcare Research
Manaaki Whenua

Juggling bullets with biodiversity

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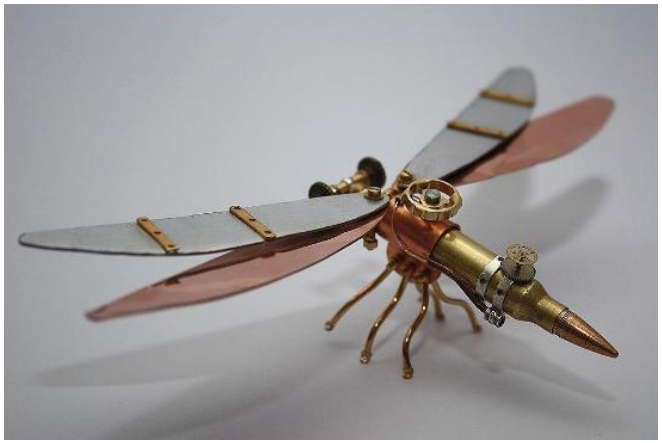
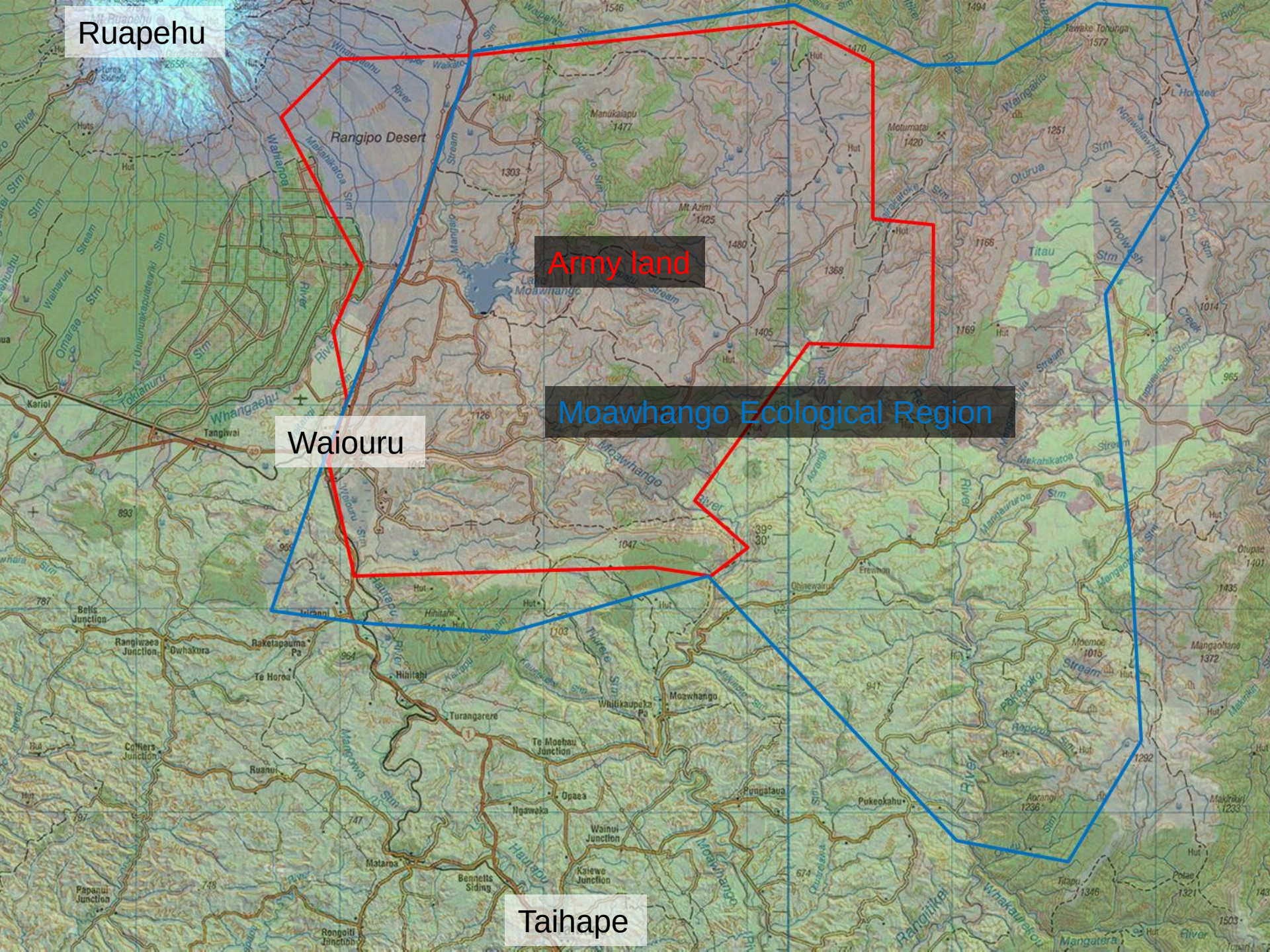


NZ Army land management

- 63 000 ha of Crown land administered by the New Zealand Defence Force
- Used for military training/exercises
- Sits within the Moawhango Ecological Region


Ruapehu
Army land
Moawhango Ecological Region
Waiouru
Taihape
Rangipo Desert

Military training/exercises

- Cross country driving/navigation
- Live firing, detonation and combat training
- Requires large open areas

Conservation values

- 1 of 3 major red tussock refuges in North Island
- High concentration of plants with unusual or restricted distribution (Rogers 1991)

Other non-military

- Recreation, hydroelectricity generation

Land management issues

- Vegetation: scrub succession post fire, shelling, off-road vehicle use, plant pest control, animal pest control, wild horse management
- Areas of significant conservation value: forest remnants, shrublands, wetlands
- Management of Lake Moawhango by Genesis Energy
- Recreational use

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Management strategies

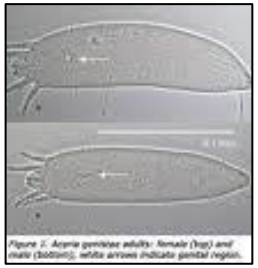
Plant pest control

- Heather – scrub succession long-term and biocontrol
- *Pinus contorta* – herbicide and cutting
- Hawkweed – min. disturbance, biocontrol
- Gorse - herbicide
- Broom – herbicide and biocontrol

Three examples

- Heather

- Broom

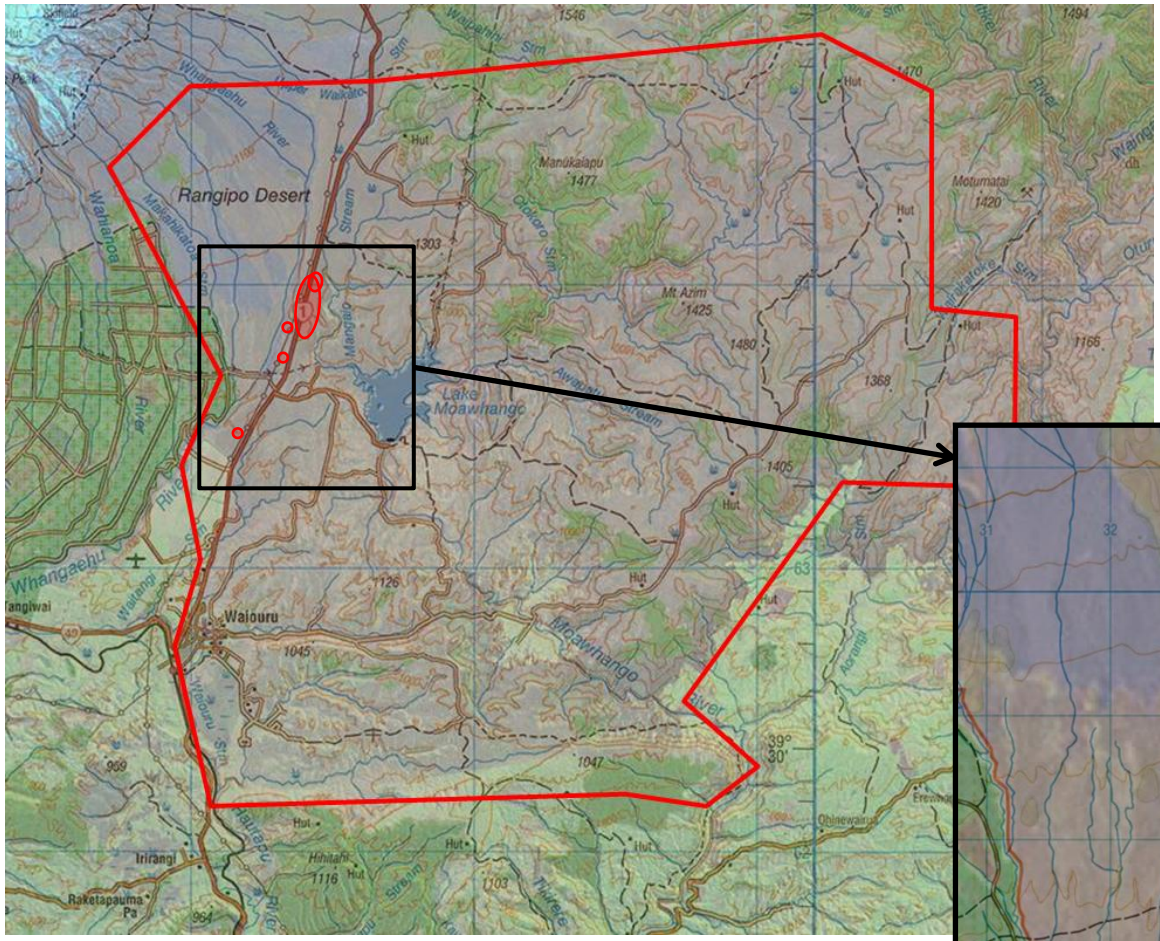


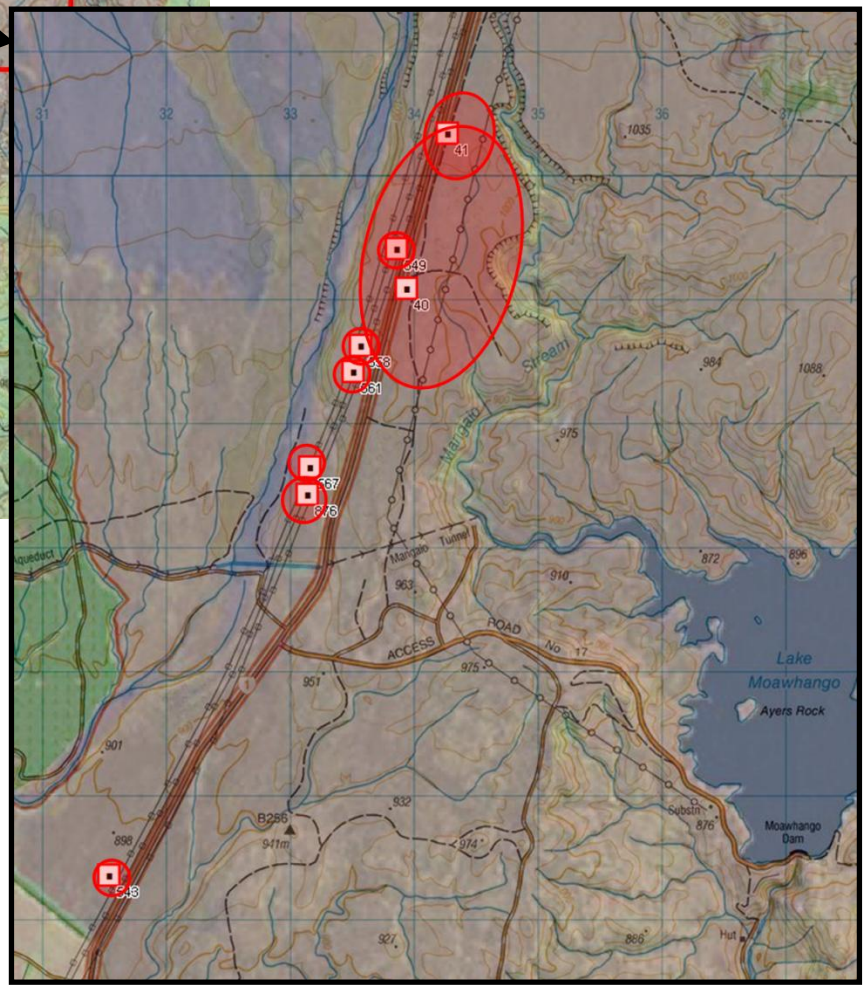
- Hawkweed

Heather beetle

- In excess of 7 million beetles currently on Central Plateau
- More than 200 ha of high to medium density heather has been killed at one site
- Several other outbreak sites are building in the area

Beetle outbreaks

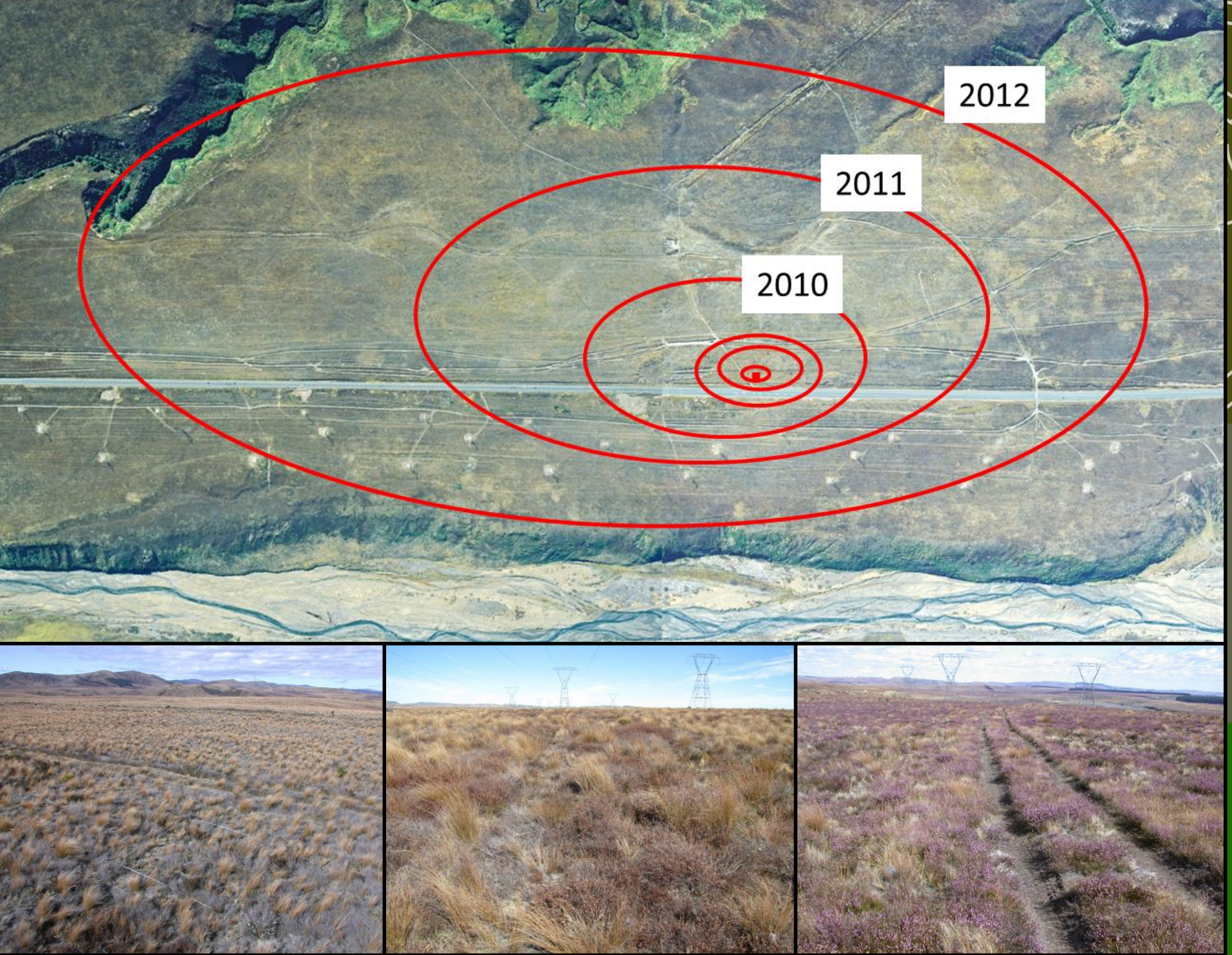




30 000 ha infested with heather

20 000 ha high use training areas

200 ha controlled to date


2012
2011
2010

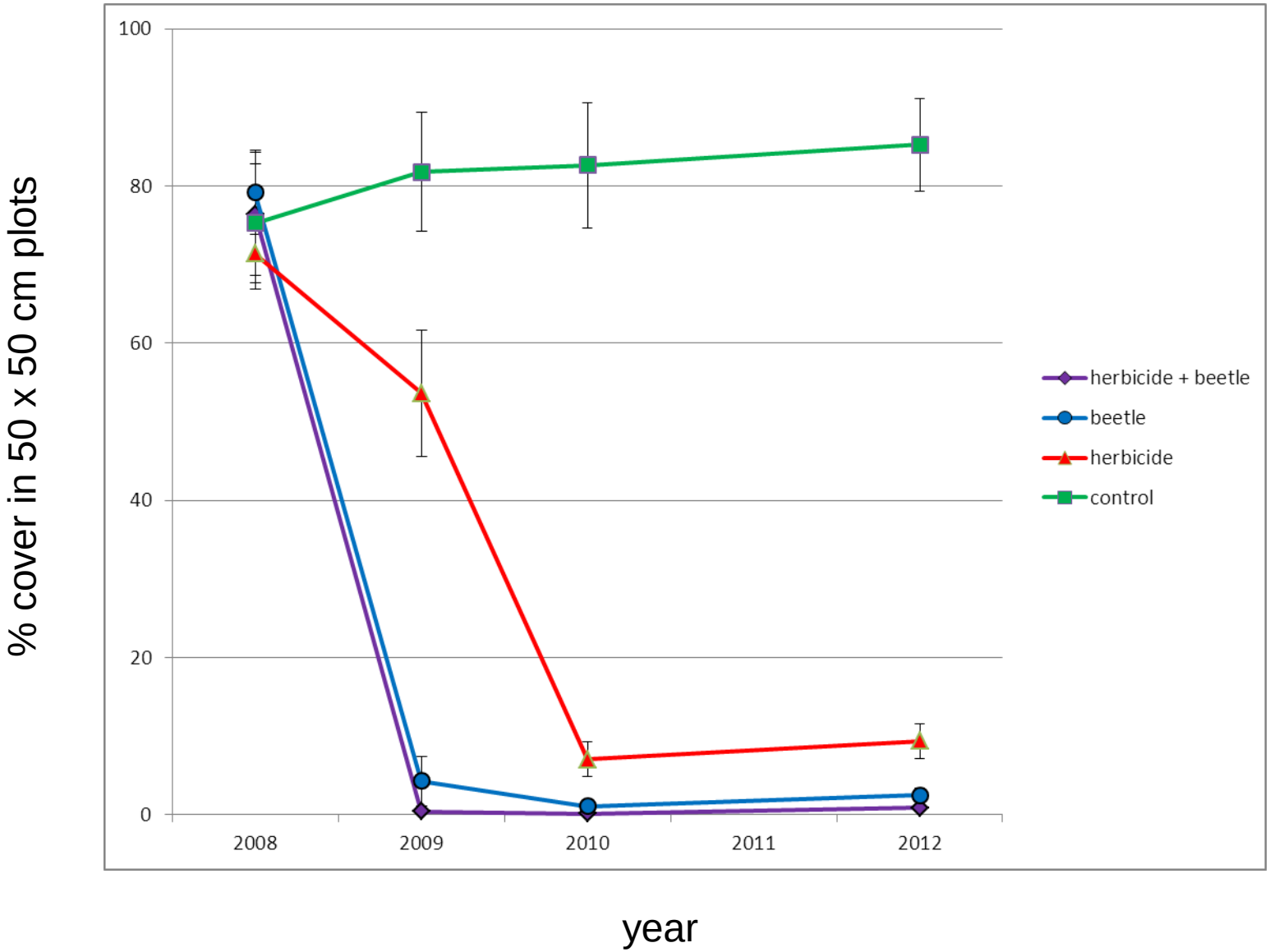
Benefits to the NZDF

- Helping to maintain 20 000 ha of high use open areas for cross-country driving, live firing, detonation and combat training
- New funding required to spray herbicide at $800 000 per annum not being sought
- All spraying for heather has been stopped (community resistance a factor)

Benefits to biodiversity

- Heather density reduced by 99%

Heather

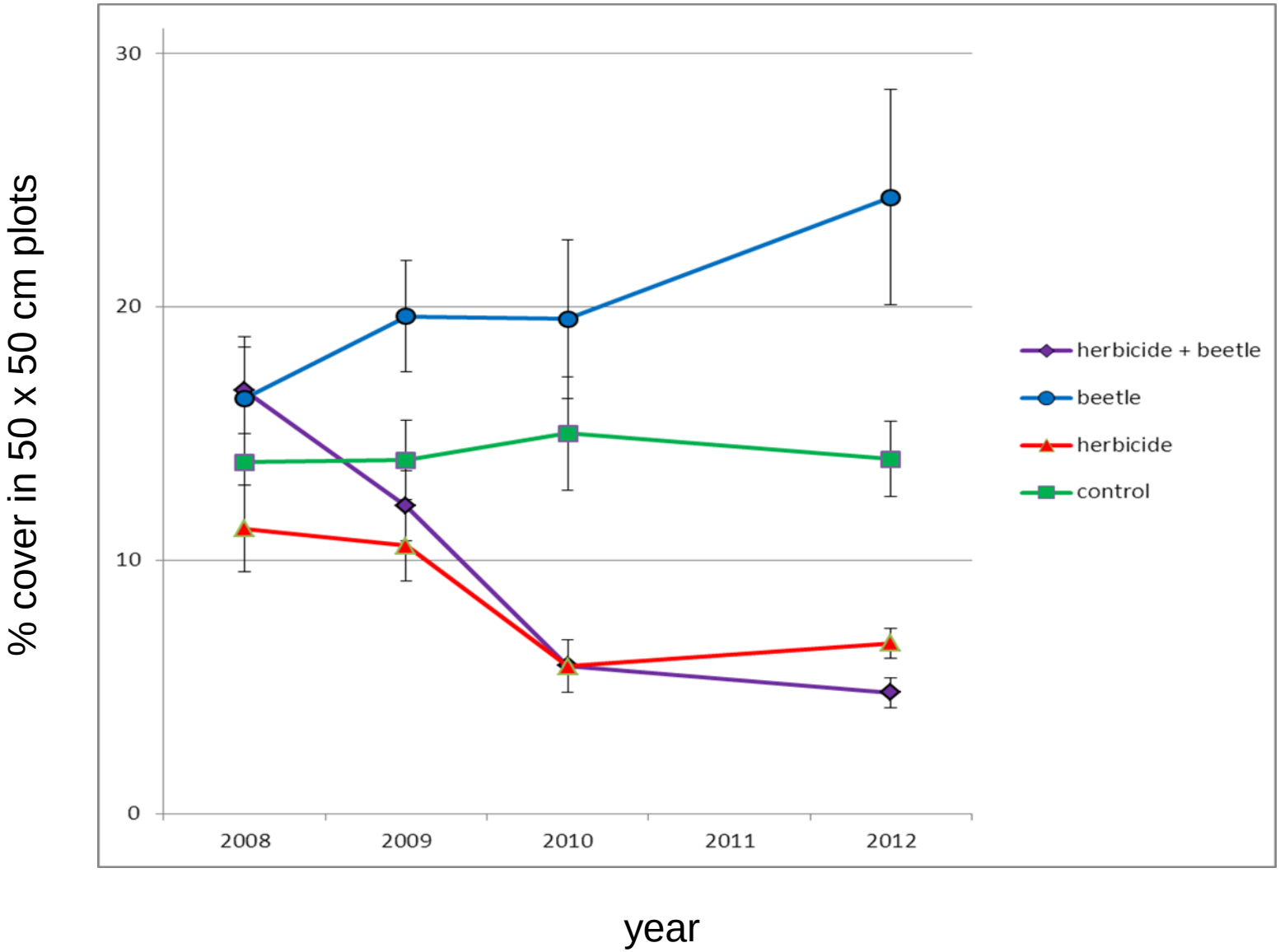

% cover in 50 x 50 cm plots
100
80
60
40
20
0
2008
2009
2010
2011
2012
year
herbicide + beetle
beetle
herbicide
control

Benefits to biodiversity

- Heather density reduced by 99%

- Beetles out-perform herbicide application because there is no non-target impact

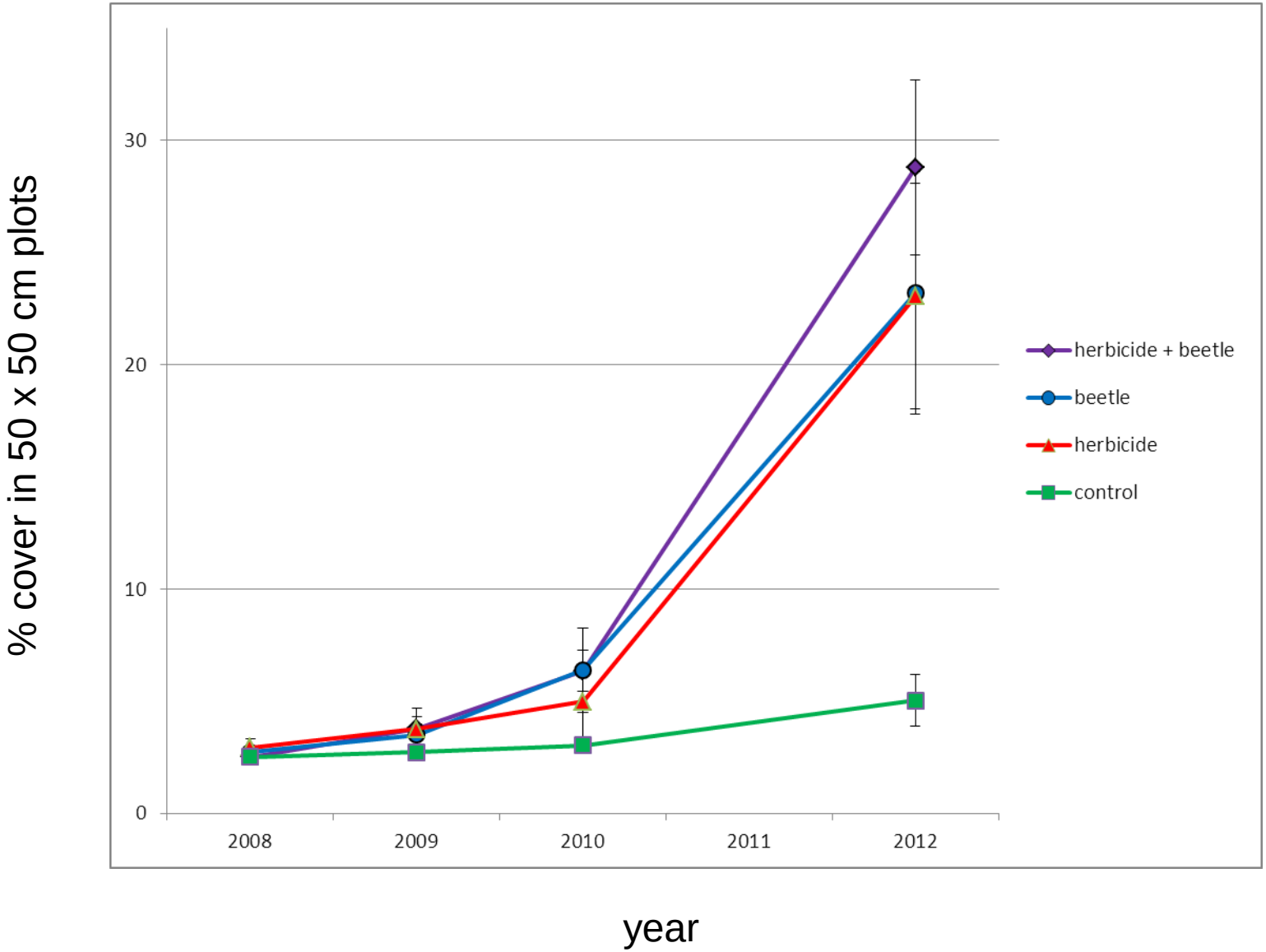
Native dicots



On-going challenges

- Effectiveness of beetles on outliers - will spot spraying still be required?
- Slow beetle progress to date and performance at higher altitudes unknown - beetles with better climate match and genetics required?
- Monitoring knock-on effects (short vs. long-term changes?)

Exotic grasses



Summary

- Juggling military and conservation land managements issues within the Waiouru Military Training Area is complex
- Biocontrol of heather is an example of a sustainable solution that benefits both military and biodiversity goals

Acknowledgements

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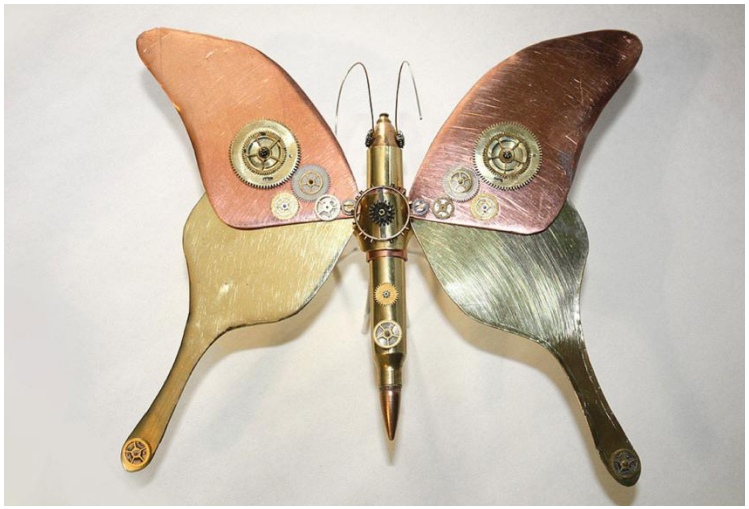
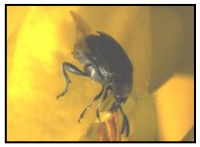
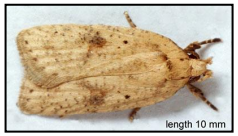


Arthrobots by Tom Hardwidge

Biocontrol agents in NZ

	Agent	First release	Modus operandi	Damage
	Twig miner (*Leucoptera spartifoliella*)	1950 (accident)	Stem miner	Reduces growth & flowering, kills branches
	Seed beetle (*Bruchidius villosus*)	1985	Seed feeder	Destroys up to 90% seed, reduces seed size
	Psyllid (*Arytainilla spartiophila*)	1992	Sap sucker	Damages new growth
	Shoot moth (*Agonopterix assimilella*)	2008	Defoliator (leaves & stems)	Reduces growth rate, kills branches
	Leaf beetle (*Gonioctena olivacea*)	2008	Defoliator (leaves & stems)	Reduces growth rate, kills seedlings
	Gall mite (*Aceria genistae*)	2008	Bud galler	Stunts growth, reduces flowering, can kill plants