








Development of re-setting toxin delivery devices for stoats and rats



Elaine Murphy; Tim Sjoberg; Peter Dilks;
Arijana Barun; Des Smith; Paul Aylett;
Duncan MacMorran; Charles Eason

New Zealand

- The endemic fauna of NZ evolved in the absence of mammalian predators – their arrival devastating
- 40% land bird spp gone
- Of the remainder, proportion classed as threatened one of the highest in the world
- Introduced rats & stoats major cause





Resetting devices would be a good addition to toolkit!

Specifications

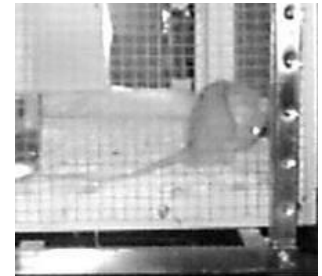
- Long-life (12 month service interval)
- Species specific
- Capable 100 kills
- Incorporate novel toxins
- Data logging capability (number fires)
- Cost-effective vs. current methods





Spitfire Development

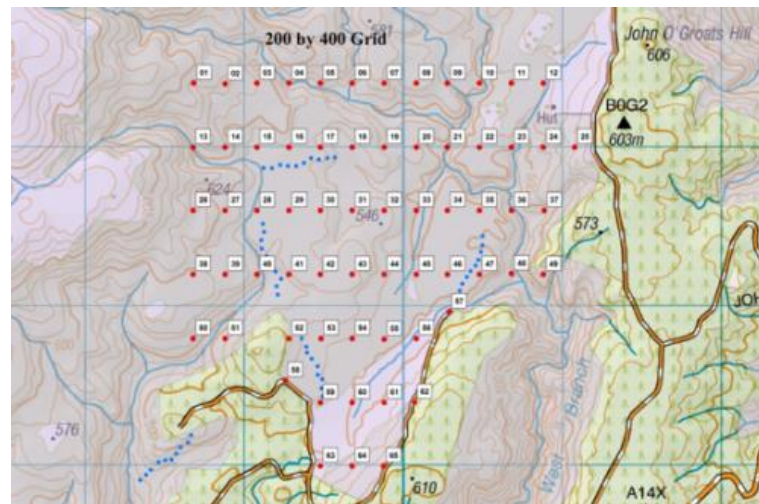
- Spitfires: 5 years of development
- Animal triggers Spitfire - 800 mg toxin squirted onto belly, which is ingested by grooming
- Proof of concept trials on stoats in 2009 with PAPP
- Same internal components can have different triggers, housing & toxins depending on species (eg. stoats, rats, ferrets, feral cats, possums)



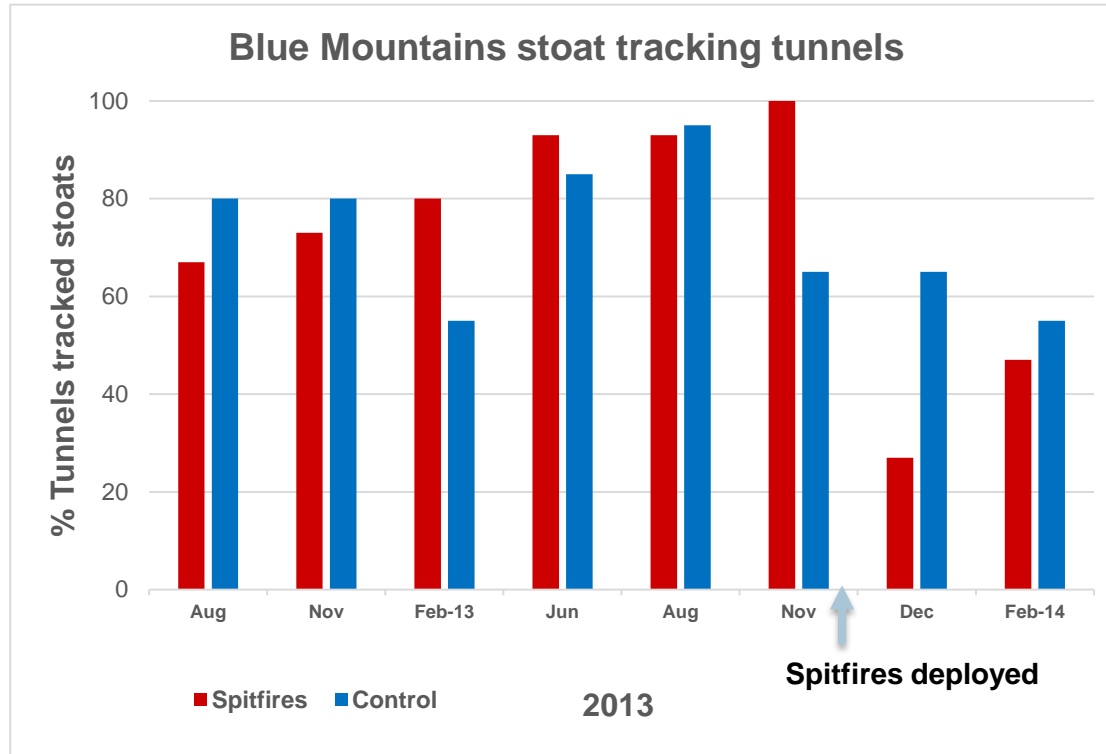
Proof of performance for stoats



- ❑ 65 spitfires
- ❑ 400 ha



Stoat Spitfire field trial



- Spitfires triggered 11 times 26 Nov – 14 Dec
- Tracking tunnels set 16th Dec

Stoat shots – trail cameras

Camera No.	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	2.12	2.13	2.14	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13	3.14		
2	0	0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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17	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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25	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0	0	0	0	0	1	0	0	x	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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29	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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59	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
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- 8 Oct – 21 Oct: 21/27 cameras recorded stoats (87 shots)
- 26 Nov – 9 Dec: 15/33 cameras recorded stoats (27 shots)
- 14 Dec – 27 Dec: 8/31 cameras recorded stoats (12 shots)

What toxin for rats?

- Spitfires squirt 800mg, assume rat ingests 500mg
- PAPP not lethal enough



Rat Spitfire lab trials

0.55% 1080

- 15/15 wild Norway rats died
- 14/15 ship rats died



12.5% Zinc Phosphide

- 17/20 wild Norway rats died
- 8/8 ship rats died



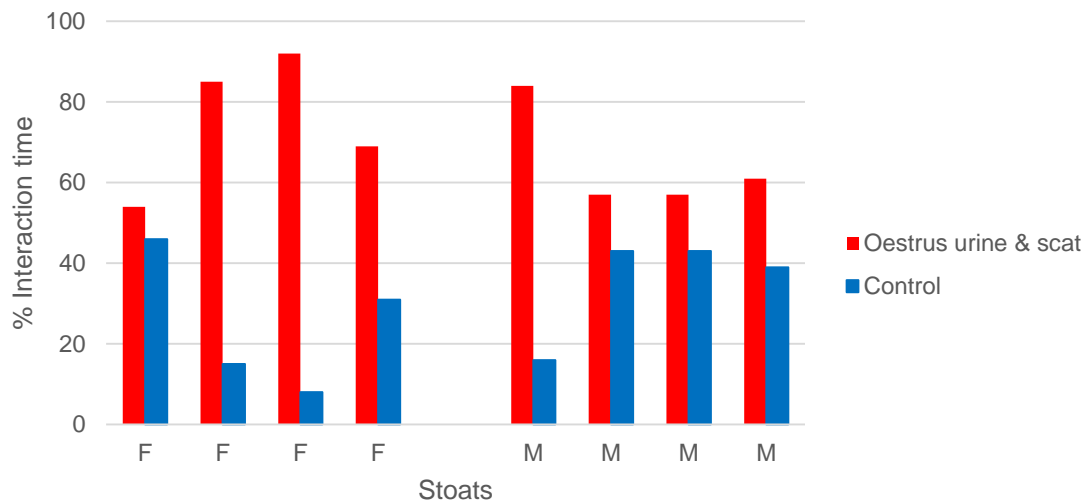
Methods - stoats

- Stoats had been in captivity c. year
- Females hadn't mated, so stayed in oestrus over summer

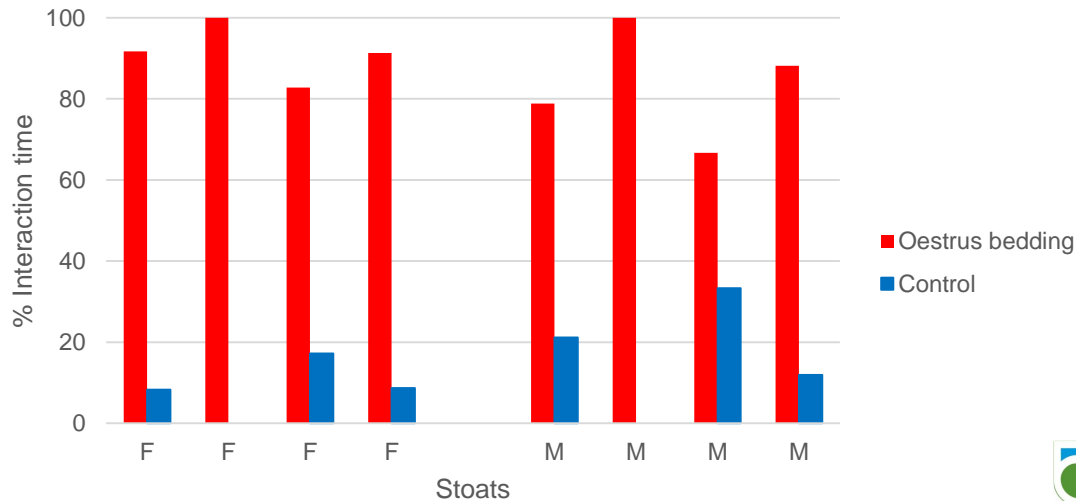


Stoat lure trials: Nov-Feb

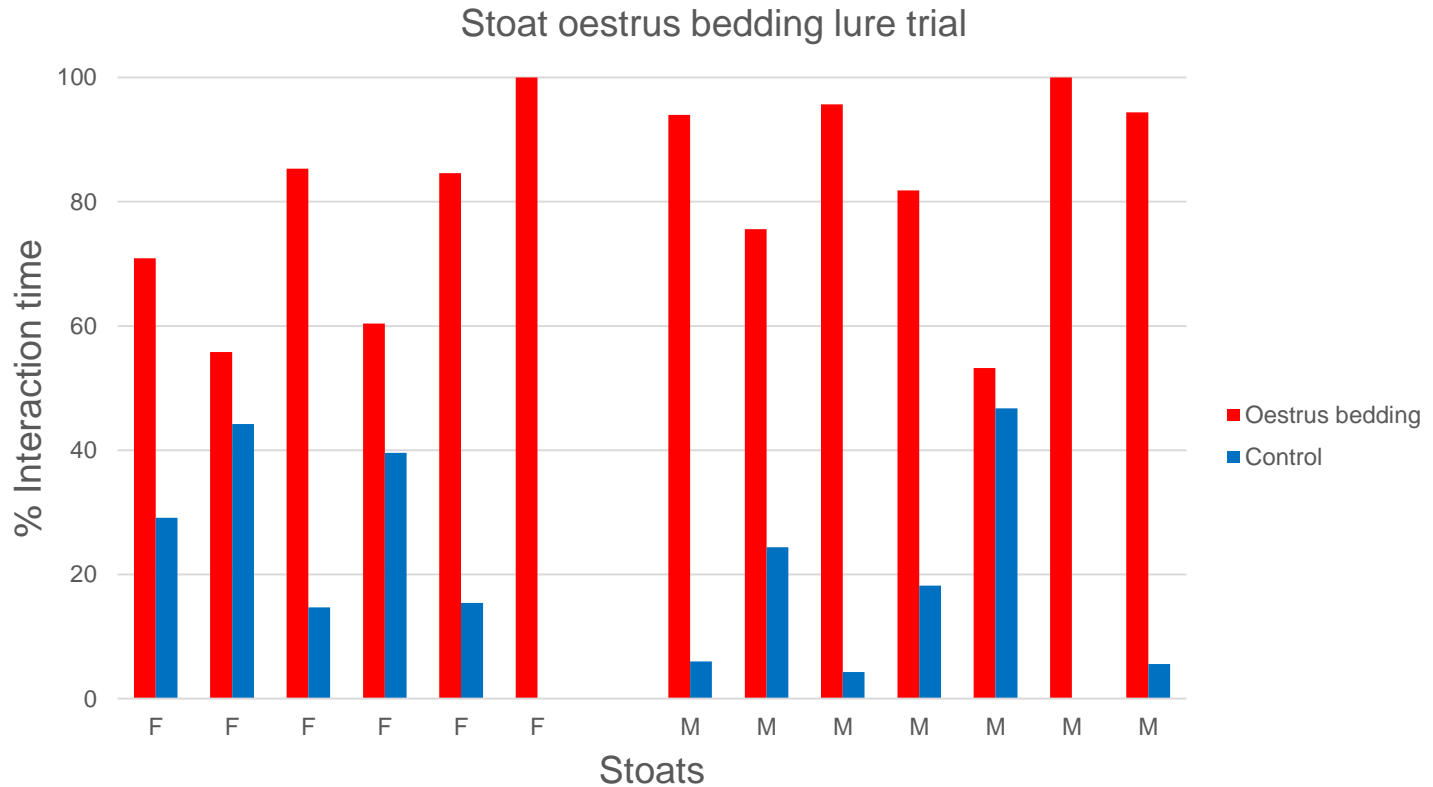
Stoat oestrus urine +scat lure trials



Stoat oestrus bedding lure trial



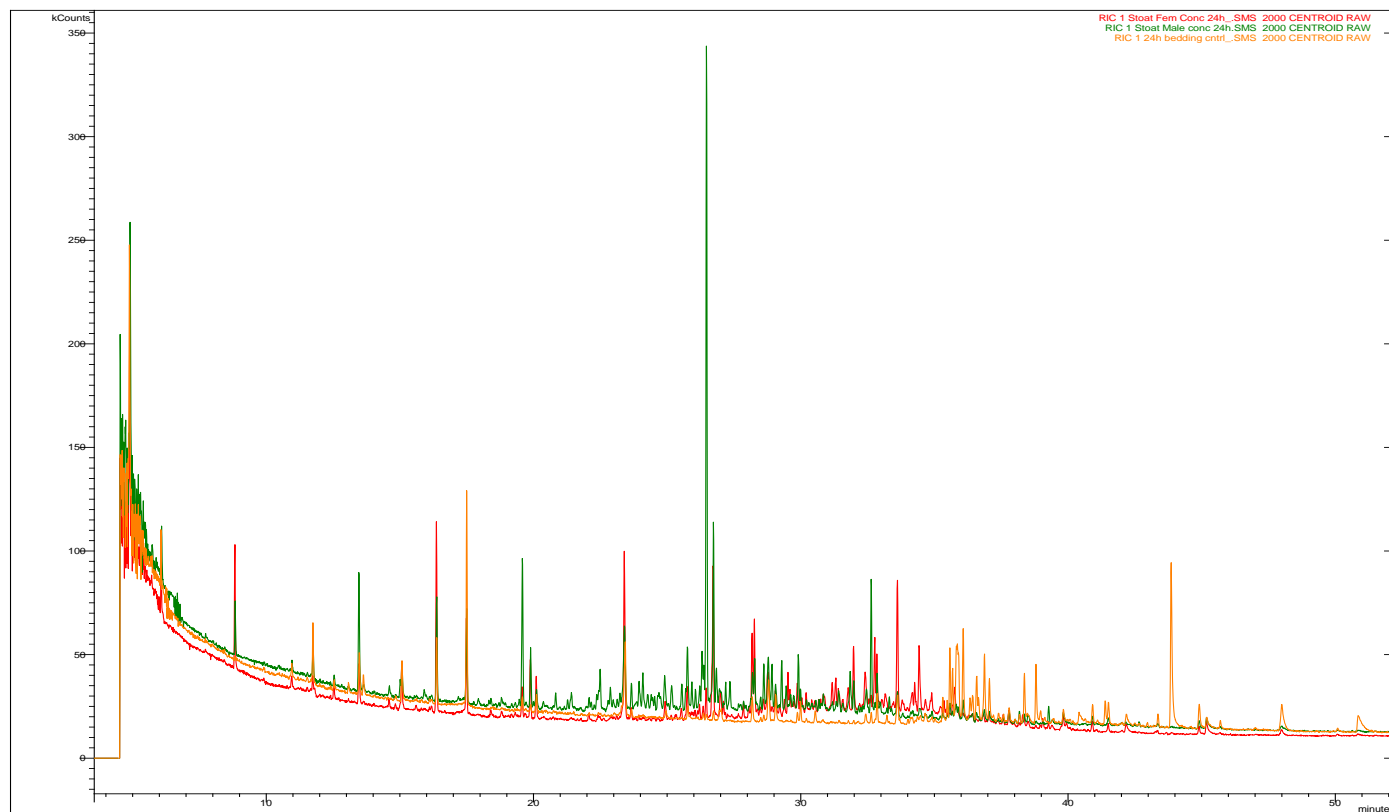
Stoat lure trials: Mar-Aug





24 hr volatile collection from bedding – Andrew Twidle

Overlaid Chromatogram Plots



Red trace = Female bedding

Green trace = male bedding

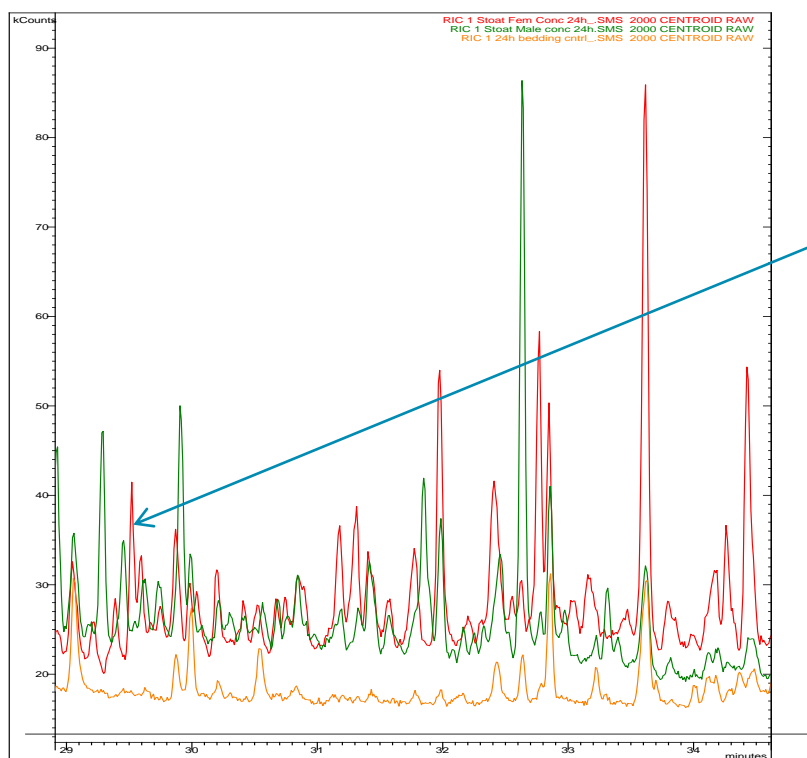
Brown trace = control bedding

Analysis of volatiles – Andrew Twidle

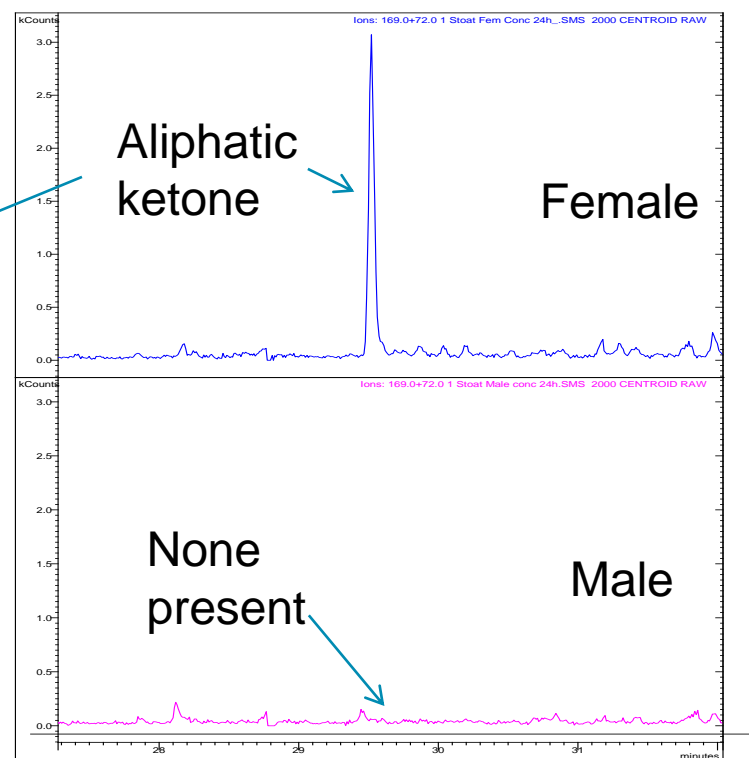
Zoom in of chromatogram – one female unique compound (red trace)

Ion search and identification of unique compound in female vs male

Overlaid Chromatogram Plots



Chromatogram Plots



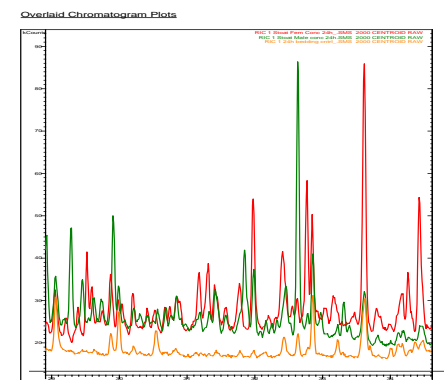
Plans for 2015

Spitfires:

- Rat 1080 Spitfire field trial
- Continue development of feral cat & multi-species Spitfire

Lures:

- Solid phase micro extraction (SPME) gas chromatographic analysis
- GCMS profiles
- Cheap long-life liquid lure!



Partners and Collaborators



Department of
Conservation
Te Papa Atawhai