



Landcare Research
Manaaki Whenua

The Economics of Weed Biocontrol – A Preliminary Analysis

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The Economics of Weed Biocontrol

- We always claim that weed biocontrol in New Zealand is highly cost-effective
- Where's the evidence?
- In NZ we do have some cost-benefit analyses of what will occur if biocontrol is successful e.g. broom, gorse, *Hieracium*, Californian thistle
- But no examples of demonstrated \$\$ benefits from a successful biocontrol programme
- Used Australian analyses – substantial and well-resourced under CRC Weeds

Cost-benefit Analyses of Weed Biocontrol

- Why has NZ been so slack?
- Some quite good reasons really
- Studies in advance, e.g. broom, can be justified because they help the ongoing programme
- Post-hoc studies have value to the whole discipline but not directly to sponsors of new biocontrol programmes
- Expensive
- Generally not 'cutting-edge' science so were hard to fund under the FRST system

What are we doing about this?

- 2 yrs Core \$\$ into 1st cost benefit study of a past successful programme – St John's wort, *Hypericum perforatum*



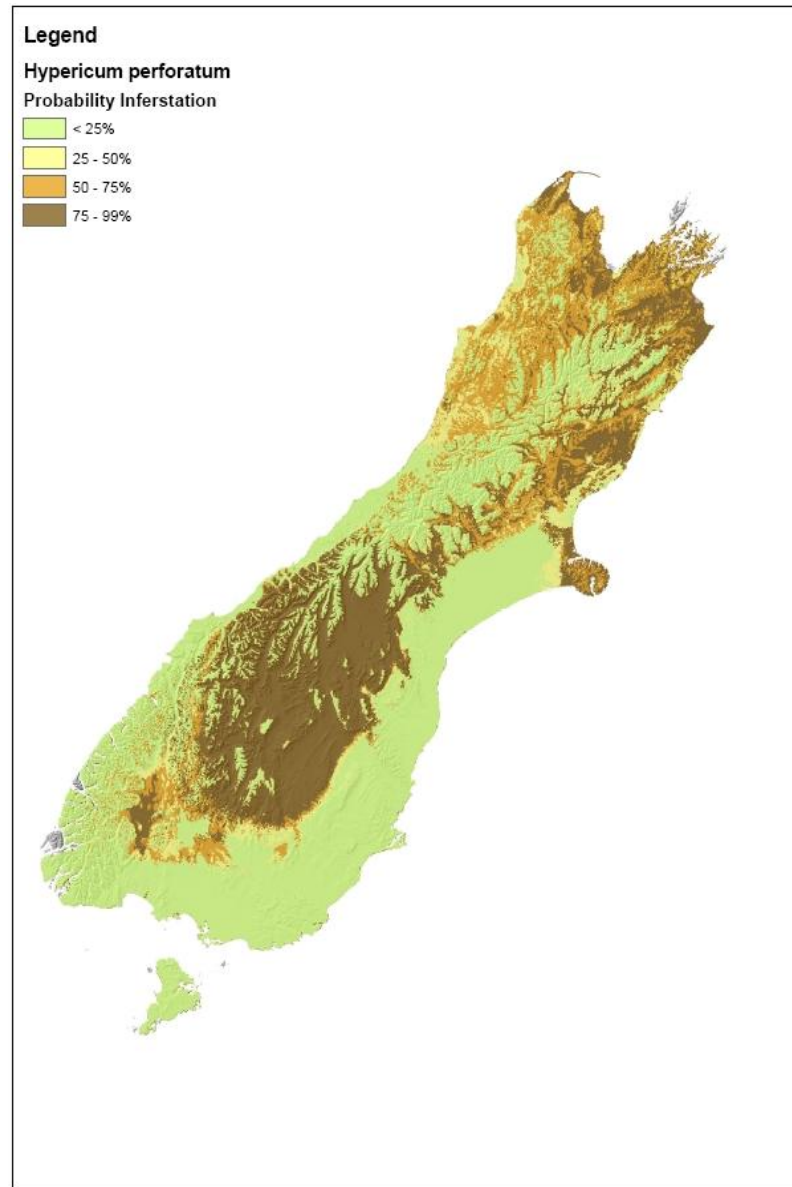
SJW cost-benefit analysis

- Start with scenarios to model
 - 1/ Biocontrol occurs
 - 2/ No biocontrol (do nothing) – slow weed spread
 - 3/ No biocontrol – fast weed spread

Weed nowhere near its full potential range when the biocontrol programme started

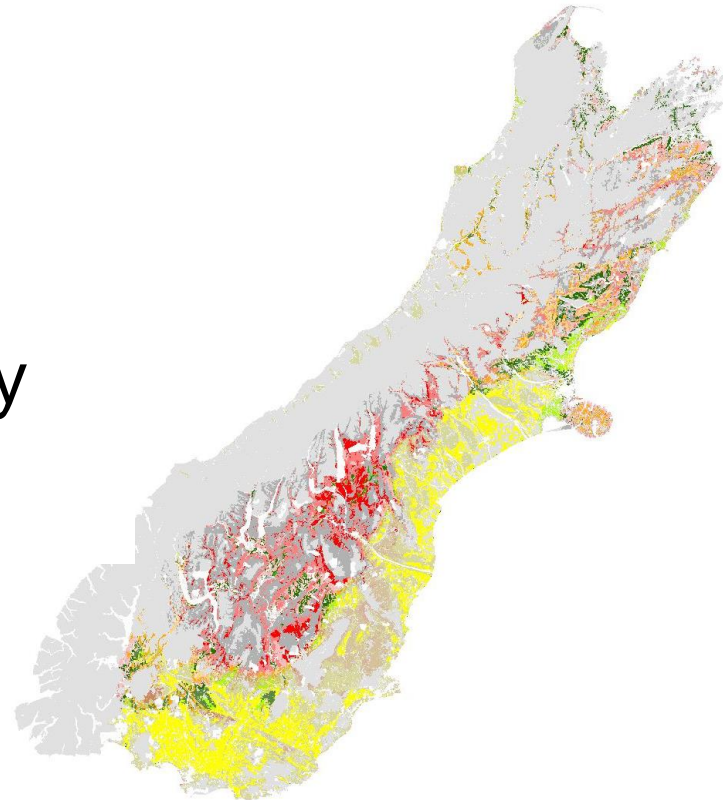
What was potential range of SJW?

- Ecoclimatic modelling – correlating present distribution (SI) with climatic variable at these sites



Fine tuning potential range of SJW

- Various 'masks' applied e.g.
- Only Land Use Capability classes 4-6 and only pasture
- Only inc. 20% of highly productive land
- Only sheep, beef + deer (not dairy)
- Only where >50% prob. SJW infestations



660,000 ha

How quickly would SJW have spread?

- Spread assumptions – 50-200m/yr, peak at 10-30 years in a given area
- Lower rate roughly corresponds to assumed arrival date and level of infestation 50 yrs later (when biocontrol started)
- New loci – assumed 1 per 4 years (50 yrs – 14 release sites)
- Start model at 5000 ha
- Low spread – 46000ha current; 77000 by 2042
- High spread – 430000 current; 660000 by 2042

Losses from SJW

- Only considered displacement of pasture
- Used MAF Farm Monitoring: \$25 return per SU + average stocking rates – losses \$109/ha
- Also control costs (hand pulling \$6/ha) on infestations on higher value land (20% of land)

Costs of SJW biocontrol

- Old programme – so based costs on what would be incurred nowadays
- Importing, releasing, initial monitoring/further distribution of agents (no host range testing in NZ; no EPA process)
- \$229,000 - but spread 1940-1960s (3 agents) (Net Present Value analysis)

Cost/benefit of SJW biocontrol

NPV (\$million)	BC	No BC low spread	No BC high spread
BC cost	\$14.72	\$0.00	\$0.00
Production loss	\$260	\$420	\$1,760
Net benefit BC introduction		\$140	\$1,490

- Net Present Value analysis = NZ better off by \$140m – \$1490m since start of BC programme
- Benefit-Cost ratio: >100

Biocontrol of Ragwort – SFF project

- Very preliminary analysis
- Ragwort control (West Coast) \$980/dairy farm/yr
- 12,000 dairy farms – cost without BC ~\$12m
- Using proportion of land under effective biocontrol from ragwort flea beetle gives an annual saving of ~\$7m
- Potential annual gain from new agents for higher rainfall areas ~\$5m
- Ragwort plume moth, *Platyptilia isodactyla*



Mist flower biocontrol – an environmental weed

- An even more preliminary analysis
- Cost of BC programme 1996-2001: \$450K
- Benefits – mostly environmental, but control costs estimated as \$80-90K/yr

Mist flower biocontrol

NPV (\$million)	BC	No BC, no spread
BC cost	\$1.28	\$0.00
Weed control costs	\$1.35	\$4.58
Net benefit BC introduction		\$3.23

- Net Present Value analysis = NZ better off by \$3.23m since start of BC programme
- Benefit - Cost ratio: 2.5

Summary

- Preliminary analyses show very substantial benefits to NZ from biocontrol of weed – similar B/C ratios to Australia
- SJW a major benefit
- Ragwort probably a massive benefit
- Even mist flower – based on control costs only – has a net benefit
- All on-going and increasing

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