Biological control of environmental weeds: a long-term investment to protect and manage natural assets

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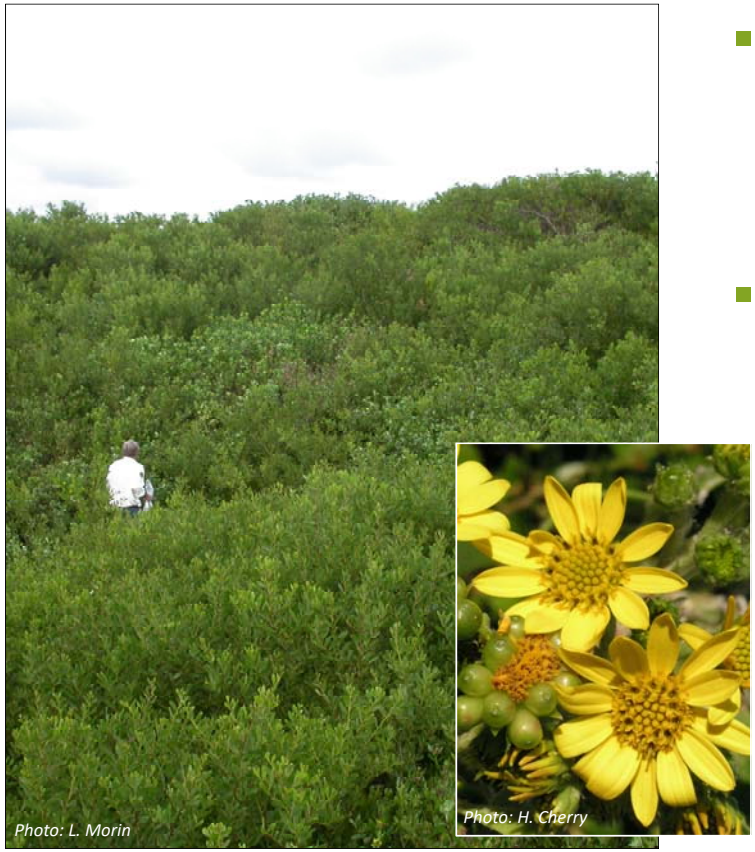
ENVIRONMENTAL WEEDS: THE PROBLEM



Bitou bush invasion, NSW North Coast

- Impacts
  - Threaten biodiversity
  - Alter ecosystem functioning
- Mechanical and chemical control methods
  - Labour intensive
  - Non-target effects on native plants: soil disturbance and drift of herbicide spray

WEED BIOCONTROL INITIATIVE IN NSW

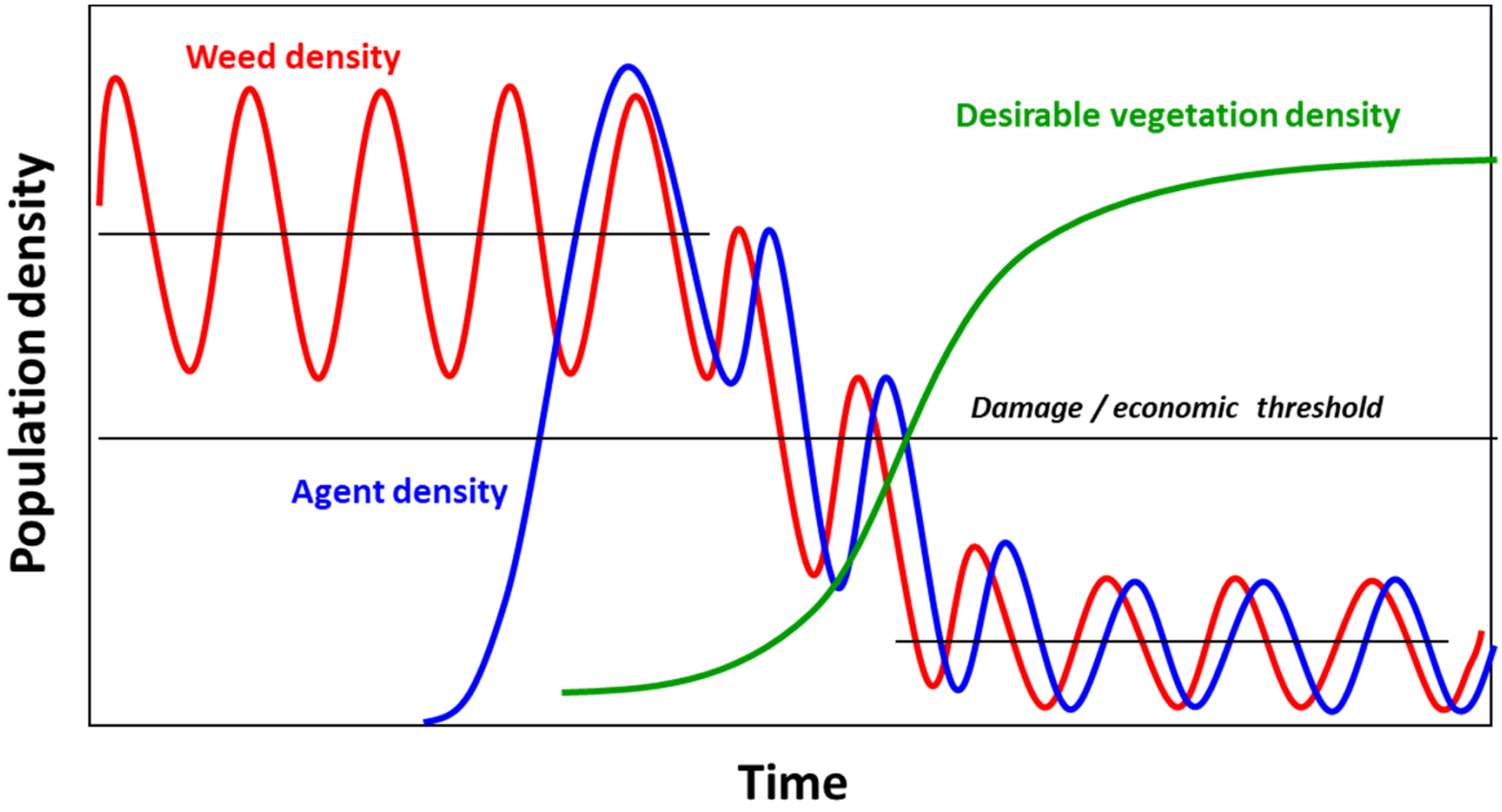
Business Plan 2016-21	Business Plan 2019-24
Stage I Prioritisation of weeds for biocontrol	**Stage III** Updating prioritisation
	Research on candidate biocontrol agents
Stage II Research on candidate biocontrol agents	Releases of approved biocontrol agents and evaluation of impact
One implementation plan	Several implementation plans *Depending on funding availability*

- Supported by NSW Environmental Trust
- Began in 2016
- Guiding principle

  Take advantage of previous or current biocontrol research projects in Australia or other countries to reduce significantly the cost, time and resources required to **deliver new biocontrol agents for priority environmental weeds in NSW**

Photo: http://www.lovepeacechickenfeet.com/x/piggybacking-your-work/

CLASSICAL BIOCONTROL: THEORY



KEY STEPS TO IMPLEMENT CLASSICAL BIOCONTROL

Native range surveys to identify promising candidate agent(s)

Host-specificity testing of agent in quarantine facility

Approval to release agent in Australia

Australian Government
Department of Agriculture, Water and the Environment

Evaluation of establishment, spread and impact of agent

Large- scale releases of agent

Mass-rearing of agent

Photos: K. Ireland, L. Morin, A. Mcconnachie, B. Gooden

CLASSICAL BIOCONTROL: EXAMPLE

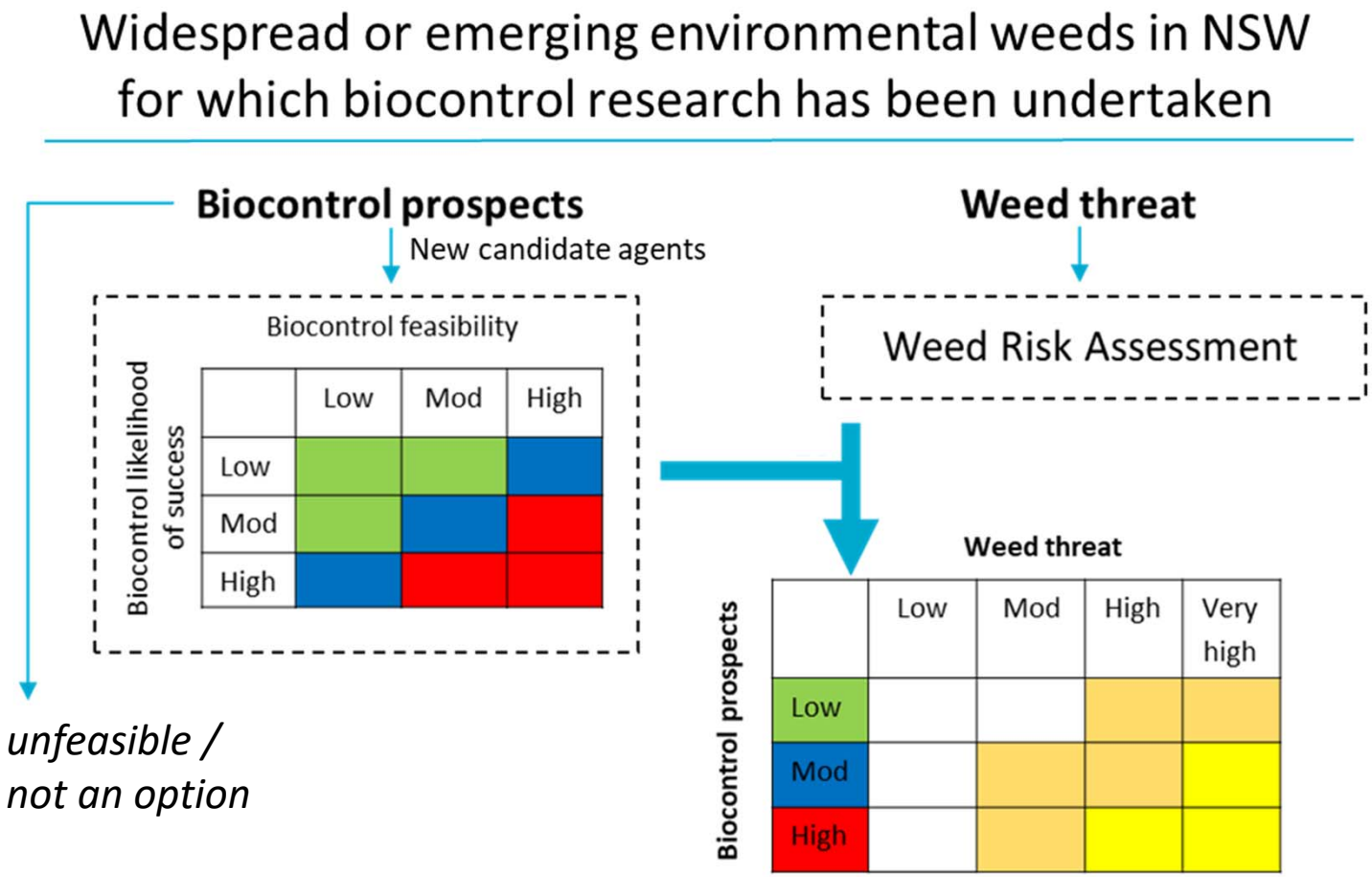
Successful biocontrol of bridal creeper at Yanchep National Park, Western Australia

2000

2003

Photos: J. Scott, K. Batchelor, L. Morin

NSW INITIATIVE: PRIORITISATION OF TARGETS



UPDATES: ON-GOING HOST-SPECIFICITY TESTING

- Leaf-feeding thrips (*Pseudophilothrips ichini*) on **broad leaved pepper tree**

Photos: M. Rafter

Research leader: Michelle Rafter, CSIRO

- Lacebug (*Leptoypha hospital*) on **small-leaf privet**

Photo: B. Gooden

Research leader: Andrew McConnachie, NSW DPI

UPDATES: ON-GOING HOST-SPECIFICITY TESTING

- Root-feeding weevil (*Cyphocleonus trisulcatus*) on **ox-eye daisy**

Photos: A. McConnachie

Research leader: Andrew McConnachie, NSW DPI

- undescribed stem-boring herbivorous wasp recently found on **African lovegrass** during surveys in South Africa *

Photo: A. McConnachie

Research leader: Kerinne Harvey, NSW DPI

*Co-investment by the Trust to a weed biocontrol project led by AgriFutures Australia through funding from the Australian Government Department of Agriculture, as part of its Rural R&D for Profit program.

UPDATES: DISCONTINUED RESEARCH

Photo: Wikimedia commons

Research leader: Gavin Hunter, CSIRO

- Rust fungus (*Puccinia arechavaletae*) on **balloon vine**
  - Testing revealed the fungus can develop on two Australian native species closely related to the weed.

Balloon vine rust fungus readily established in the Cook Islands after introduction

UPDATES: RELEASE APPLICATIONS SUBMITTED

- Stem-wilter bug (*Catorhintha schaffneri*) on **leaf cactus** (Jan 2021)

Photo: S. Navie

Research leader: Andrew McConnachie, NSW DPI

- Rust fungus (*Puccinia rapipes*) on **African boxthorn** (Nov 2020) *

Photo: J. Heap

Research leader: Gavin Hunter, CSIRO

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UPDATES: RELEASES OF NEW BIOCONTROL AGENTS IN NSW

- Cochineal (*Dactylopius tomentosus*) on **Hudson pear** *

Photos: A. Mcconnachie

Research leader: Andrew McConnachie, NSW DPI

- Leaf-smut fungus (*Kordyana brasiliensis*) on **wandering trad**

Photo: Bega District News

Research leader: Ben Gooden, CSIRO

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UPDATES: RELEASES OF NEW BIOCONTROL AGENTS IN NSW

- Blight fungus (*Venturia paralias*) on **sea spurge**

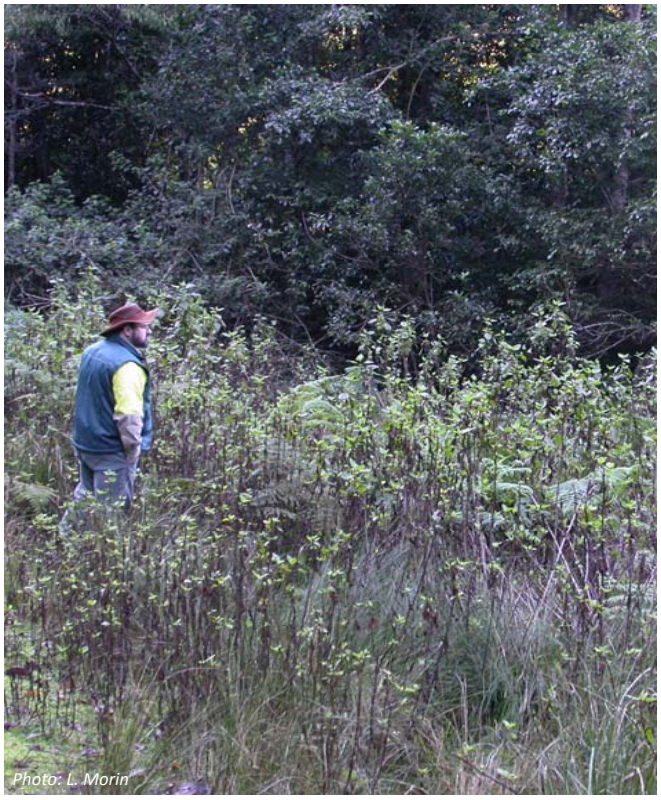
Photo: G. Hunter

Research leader: Gavin Hunter, CSIRO

Releases to occur in sea spurge infestations in Victoria and Tasmania which are the sources of seed reinvading NSW beaches

Photo: L. Morin

TAKE HOME MESSAGE



Defoliation of Crofton weed by biocontrol agent introduced in 2014

- Biocontrol programs required considerable up-front investment in research.
- Safety of the introduced agent is paramount – *no more cane toad story*.
- Successful biocontrol is a cost-effective and sustainable solution for management of widespread environmental weeds…But is not a silver bullet.
- Want to keep up-to-date about the NSW initiative?
  - Visit https://research.csiro.au/nswweeds/