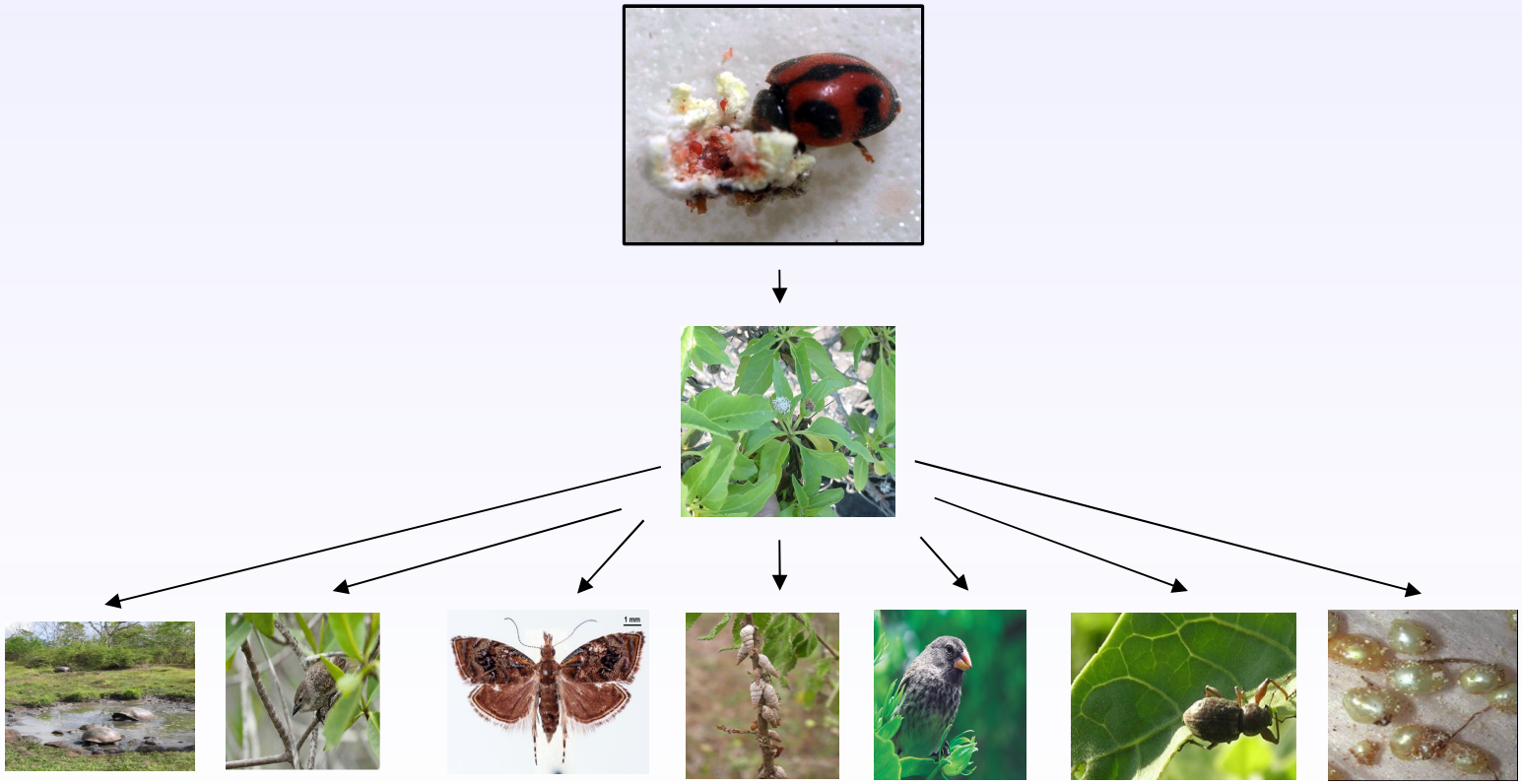
fundación
Charles Darwin
foundation

One pest's loss can be many species' gains: overview of the indirect (or flow on) benefits of biological control to the conservation of protected areas

Charlotte Causton, Charles Darwin Foundation



Talk outline

- What studies have been carried out.
- Why these kinds of studies are important.
- What kind of interactions we expect to see.
- Case study: Biological control of the cottony cushion scale in the Galapagos Islands.

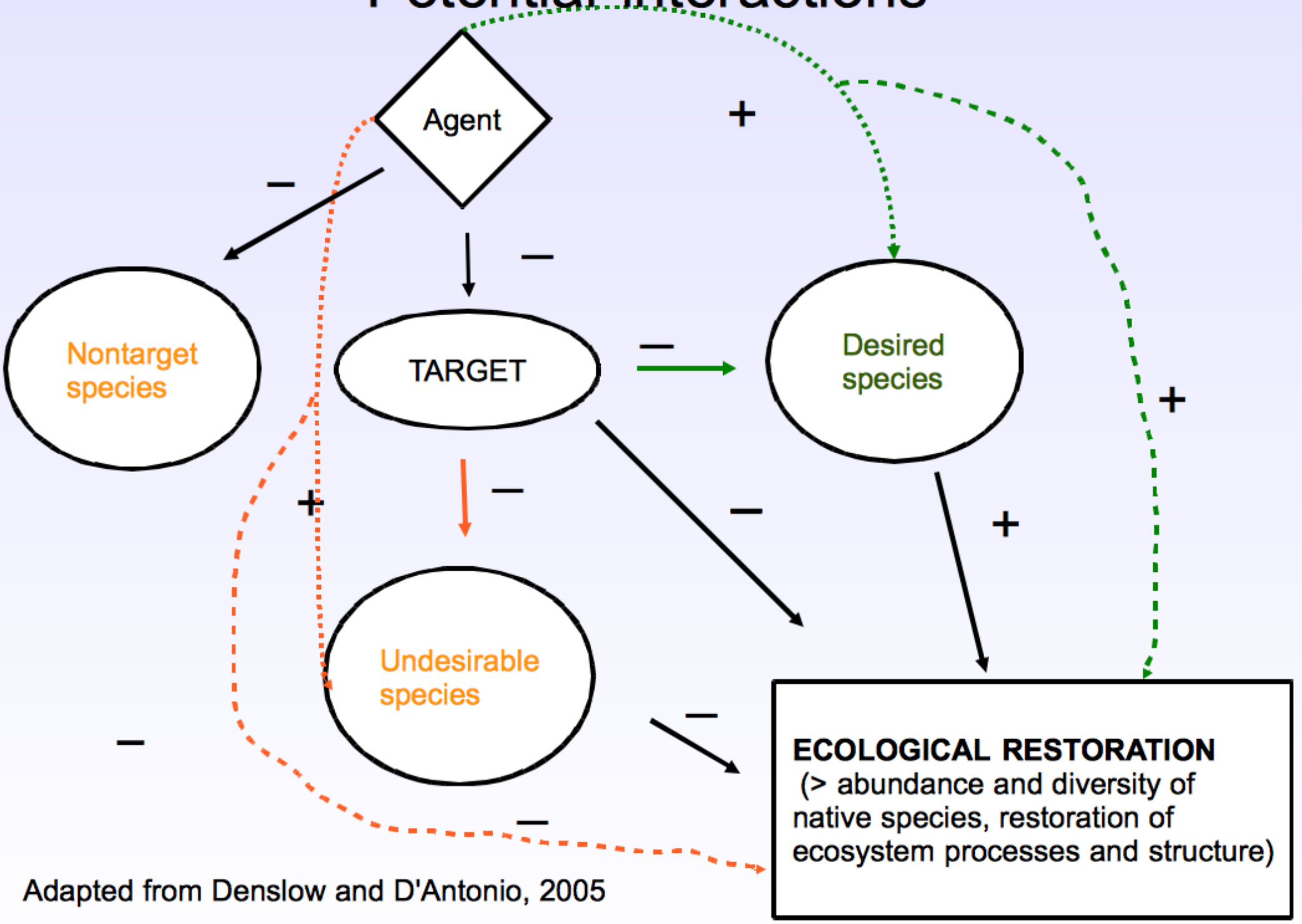
What do we know about indirect (flow on) benefits of bc?

- **Not much!**

- Very few studies that look at community and ecosystem response, but more papers that say we should do it!

- Food web analyses (e.g. Willis and Memmott, 2005), but little else done at community level in natural ecosystems.

Potential interactions



Adapted from Denslow and D'Antonio, 2005

Why is it not being done?

- Complex/hard to isolate effects of bc:

  - More species (including invasives);

  - Interplay of abiotic and biotic factors;

  - Other restoration strategies used simultaneously.

- Increases cost of bc program.
- Not normally used as condition for releasing agents.

Monitoring of indirect effects is important

- Many assumptions, but little evidence on response of species and the ecosystem.
- Pre and post release monitoring identifies:

1. If target pest is major stressor;
2. Desired ecological effects achieved;
3. Undesired ecological effects;
4. Next steps;
5. Provides information and demonstrates responsibility to decision makers, donors, and stakeholders.

Monitoring of indirect effects is important

Especially important:

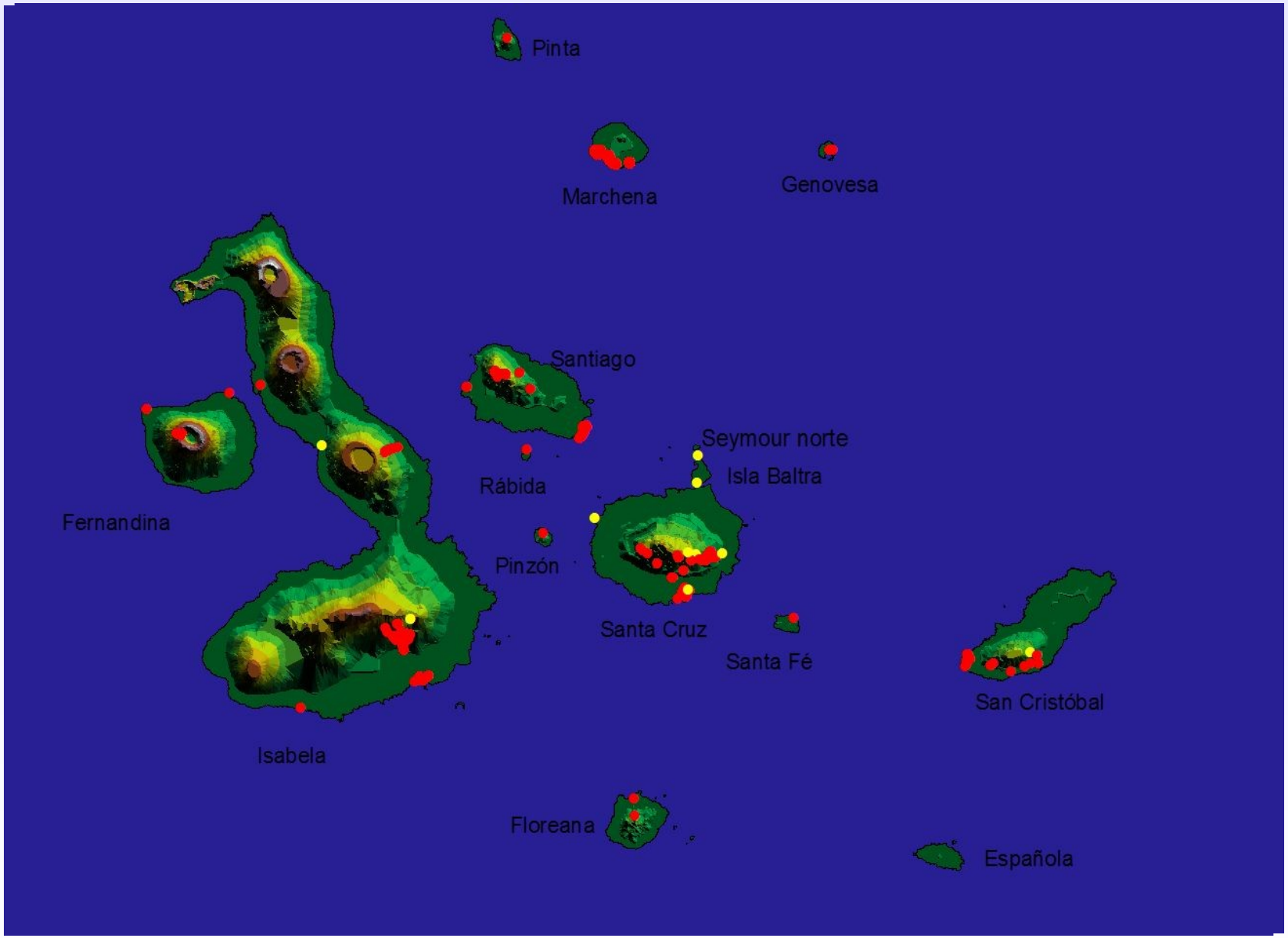
- in areas of high conservation value i.e. protected area with rare species.
- if pest species affects multiple species or is high up in the food chain.

Biological control of cottony cushion scale in Galapagos: a case study

- Young and semi-pristine islands with species vulnerable to bioinvasions.
- Found on over 75 native and endemic plant species in a diverse range of ecosystems.
- > 19 **rare** plant species.
- Impacts specialist fauna

  feeding on rare plants.

R. cardinalis liberated on 11 islands



Biological control of cottony cushion scale in Galapagos: a case study

- Limited funding.
- Focus on establishment of *R. cardinalis* and direct benefits of bc - recuperation of threatened plants (covered by Mark Hoddle).
- Likely indirect benefits to other threatened species/ecosystems.

Potential positive benefits

Food

Refuge/nesting sites

Ecosystem recovery

Photos CDF,
M. Hoddle,
C. Parent

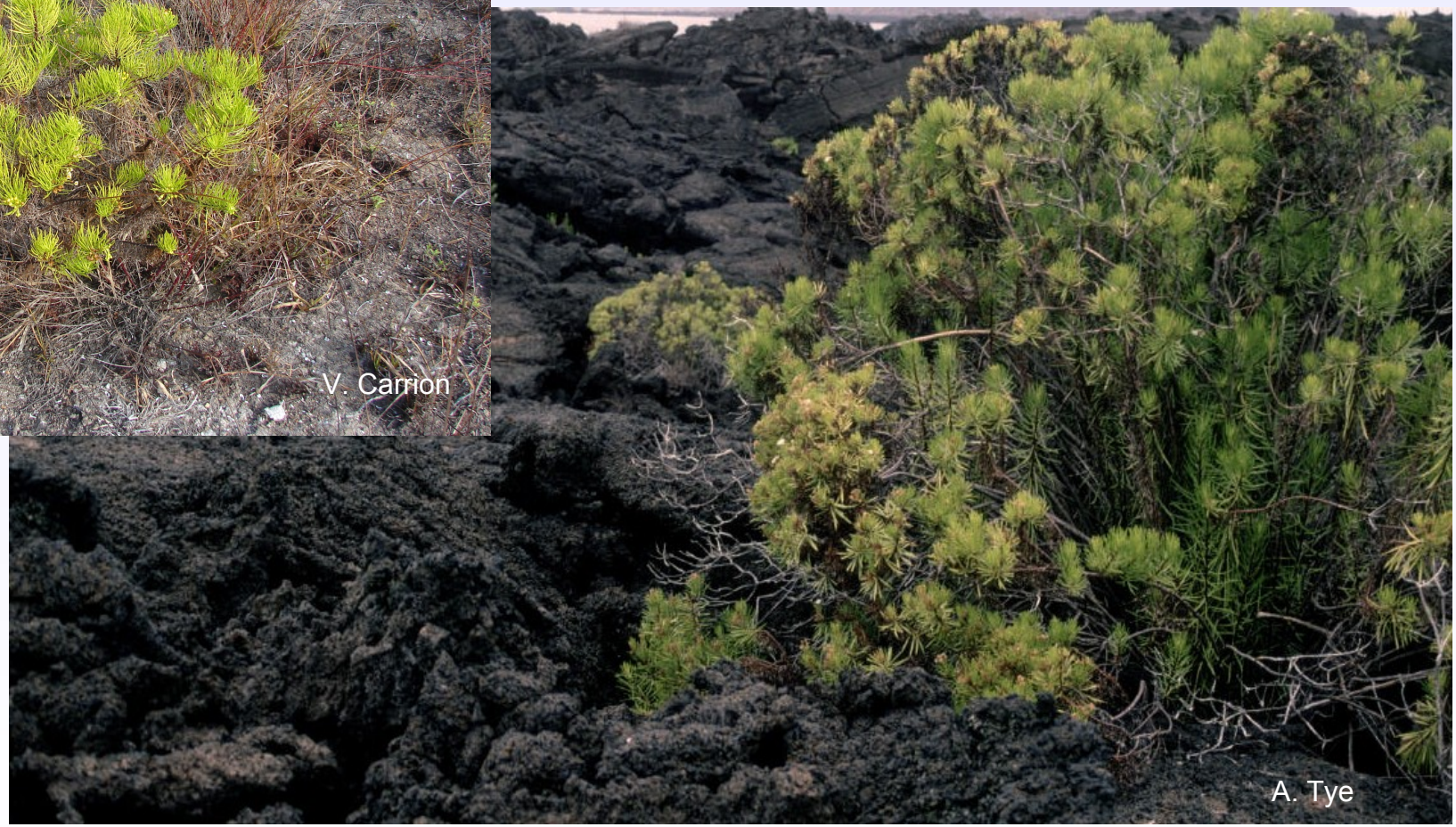
Recuperation of *Darwiniothamnus tenuifolius* on Isabela Island

Platyptilia vilema
(Pterophoridae)

Tebenna galapagoensis
(Choreotidae)

Semiothisa cerussata
(Geometridae)

Recuperation of *Darwiniothamnus tenuifolius* on Isabela Island



Recuperation of *Scalesia* species

A. Tye

Recuperation of *Scalesia species*

Protection of invertebrates such as:

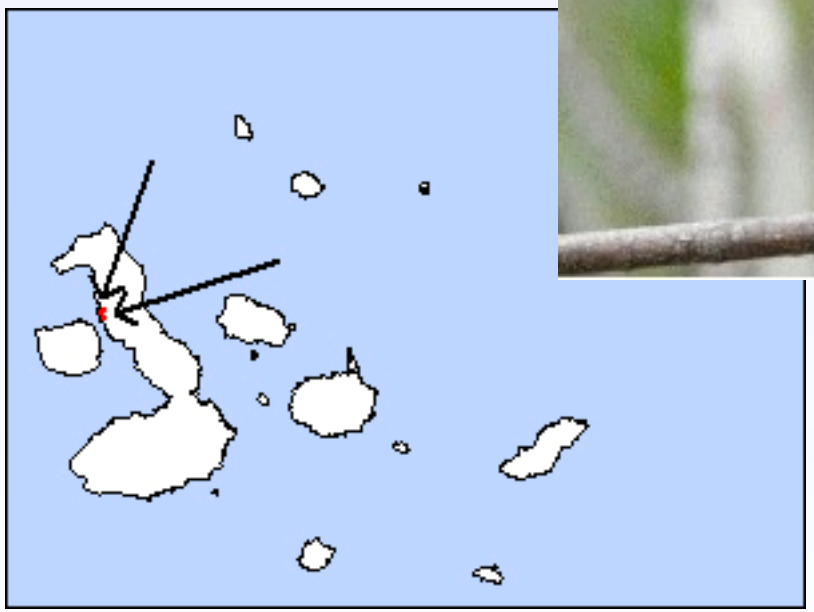
Endemic leaf miners - *Astrotischeria* spp. (Tischeriidae)

and

endemic land snails – *Bulimulus* species

Recuperation of mangrove habitats

Recuperation of mangrove habitats



Protection of refuge of Critically Endangered Mangrove finch- *Camarhynchus heliobates*


Sand dunes with sea grape (*Scaevola plumieri*)

Recuperation of sea grape habitat

Sand dunes and endemic invertebrates protected.

Margarodes similis-endemic ground pearl

Importance of monitoring program

- Demonstrated impacts to decision makers/ stakeholders- first bc program in Galapagos.
- Paved way for future bc programs.
- Defined protocols for safely using bc in Galapagos.
- Allowed us to inform community
- of the benefits- high profile, first
- visible example of conservation
- science in action.

H. Snell

Conclusions (1)

- Goal is ecological restoration not simply pest suppression.
- Understanding of negative and positive indirect (flow on) effects BEFORE a bc program and AFTER.
- Particularly important for areas of high conservation value with high endemicity and a greater number of at-risk species.

Conclusions (2)

- Complexity of natural ecosystems requires holistic approach to consider impacts of bc.
- Need for invasion biologists and restoration ecologists to work closely with biocontrol practitioners.
- Monitoring allows us to see the final outcome of the program which:
  - Influences policy;
  - Demonstrates a good return for the investment made;
  - Increases credibility for bc.

Questions for the future

- Should post-introduction monitoring become a requirement for bc programs?
- If we can't monitor them all are there some types of bc programs that are higher priority for monitoring than others?