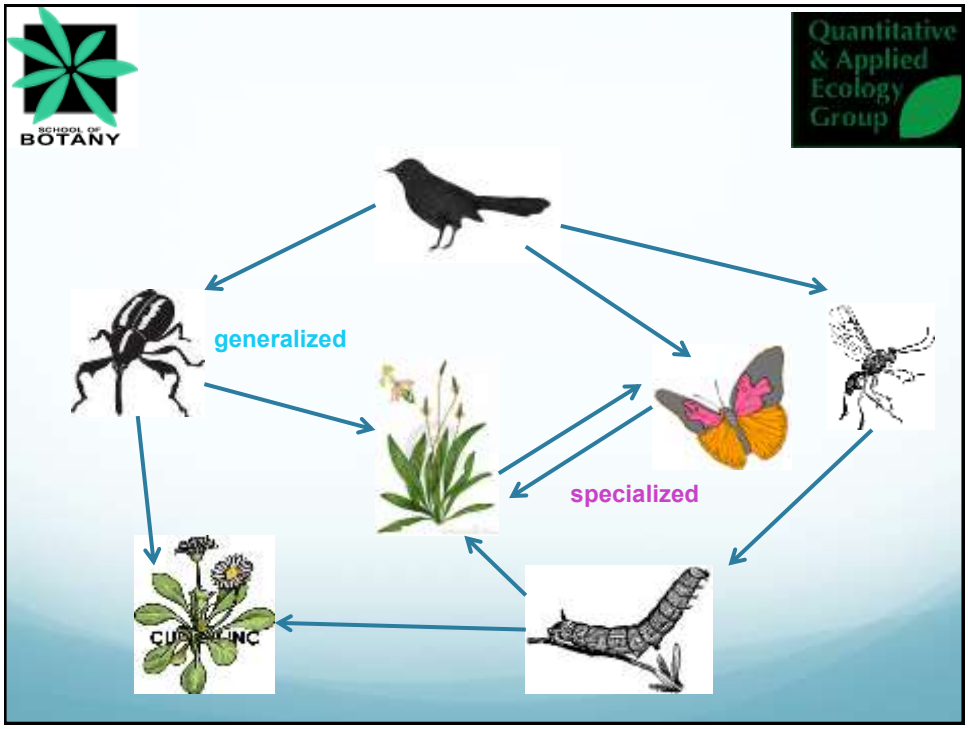
Optimal translocation of two interacting species under the risk of coextinction

Student Conference For Conservation Science
Brisbane 24th January 2013
Michaela Plein



Coextinction

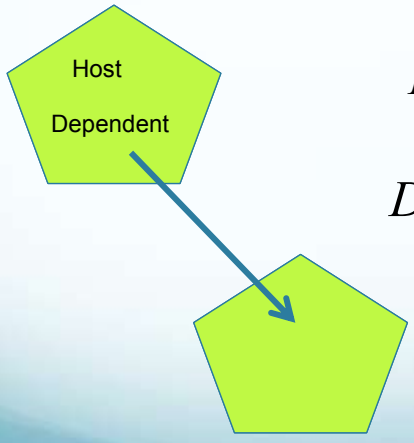
- "…process of the loss of a parasite species due to the loss of their host…" Stork 1993
- "…loss of dependent species due to a change in their host population,…" Moir et al. 2010

Conservation

Illustration by Kate Thompson taken from Burgman, M. A. and Lindenmayer, D. L. 1998. *Conservation biology for the Australian environment*. Surrey Beatty, Chipping Norton.

- Assess dependent assemblages
- Include in conservation actions
- **Translocation**

Translocation



$$H_{t+1} = H_t \exp\left[r\left(\frac{H_t}{K}\right) - \theta D_t\right]$$

$$D_{t+1} = cH_t * \left[1 - \exp\left(-bD_t\right)\right]$$

Case study

Journal of Applied Ecology 2005 **42**, 70–79

Stable coexistence of an invasive plant and biocontrol agent: a parameterized coupled plant–herbivore model

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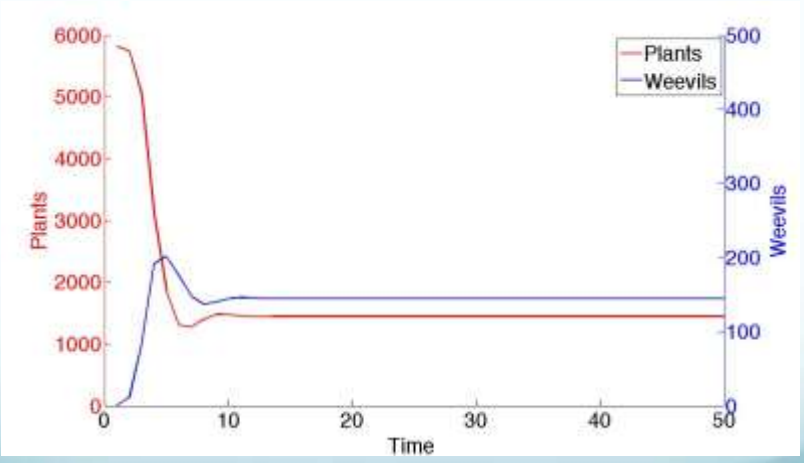
http://en.wikipedia.org/wiki/Echium_plantagineum

http://www.insecte.org/forum/viewtopic.php?f=18&t=60420

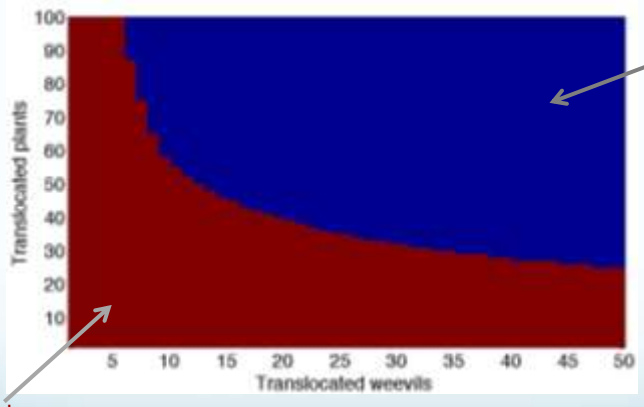
- State variables: P_t, W_t
- Control variables:
  - Translocation time T_P, T_W
  - Number to translocate N_P, N_W
- Objective: max. chance of survival of all populations

Weevil-plant dynamics



Deterministic system

Simultaneous translocation

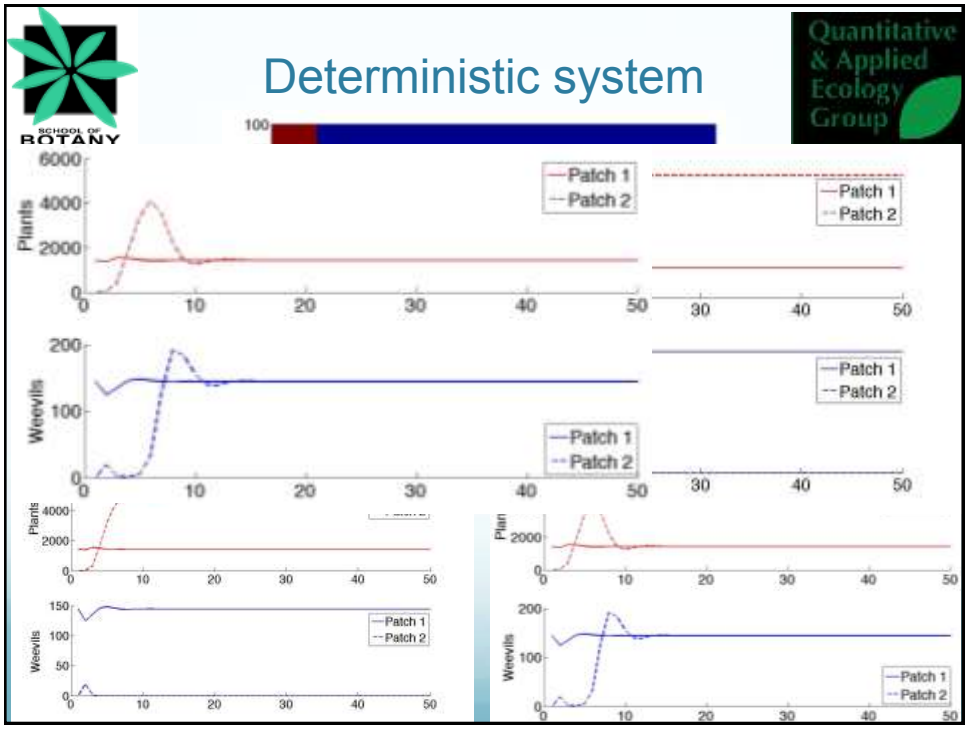


Successful translocation

Unsuccessful translocation

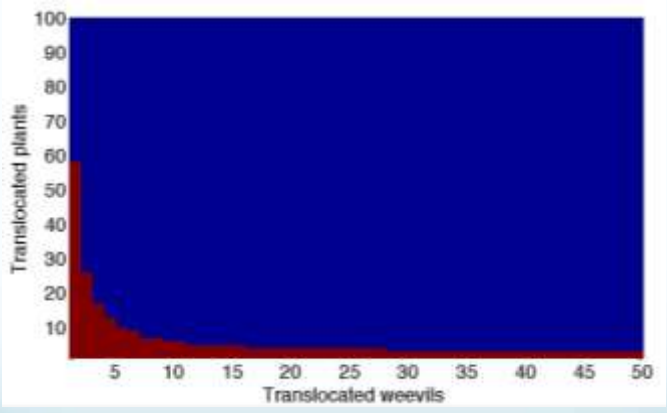
- Threshold of individuals for translocation and in original patch

Deterministic system



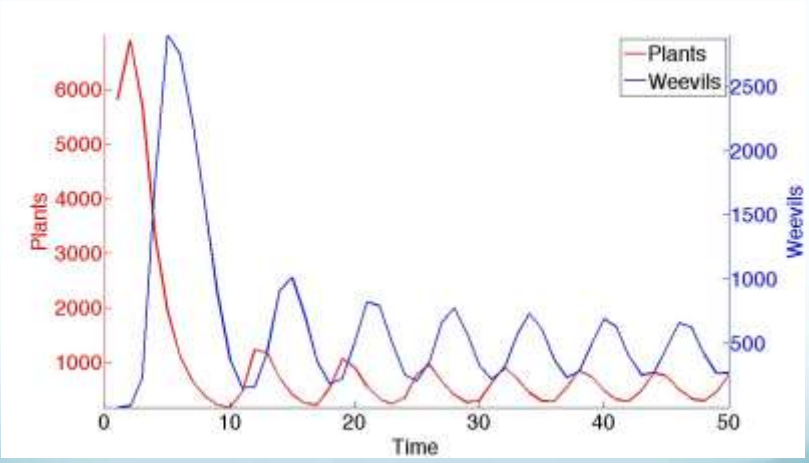
Deterministic system

Sequential translocation



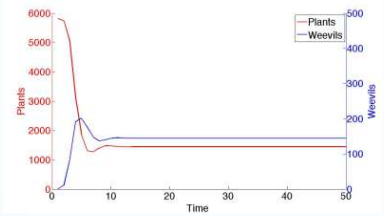
- Threshold decreases

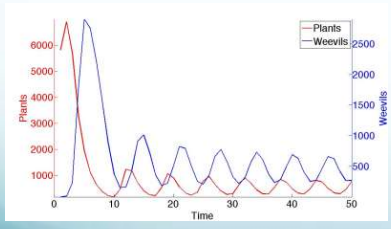
Uncertain system



- Oscillating systems:
  - Time not suitable, population size controls translocation

Summary





- Deterministic system:
  - Simultaneous translocation
    $K_{H,D}$ high, threshold low
  - Sequential translocation
    $K_{H,D}$ low, threshold high
- Uncertain system:
  - Time not suitable,
  - Population size
  - Need to know population size of host and dependent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for your attention
http://michaelaplein.wordpress.com/