Increasing the Robustness of Invasive Species Eradication Programs

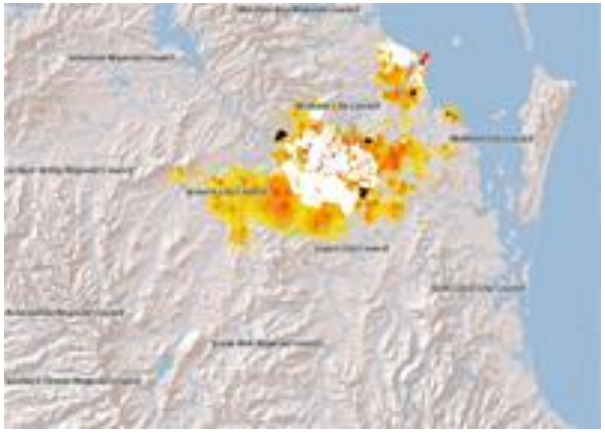
Daniel Spring, Tom Kompas

Contributed presentation at the 60th AARES Annual Conference,
Canberra, ACT, 2-5 February 2016

Increasing the Robustness of Invasive Species Eradication Programs

Daniel Spring, Tom Kompas

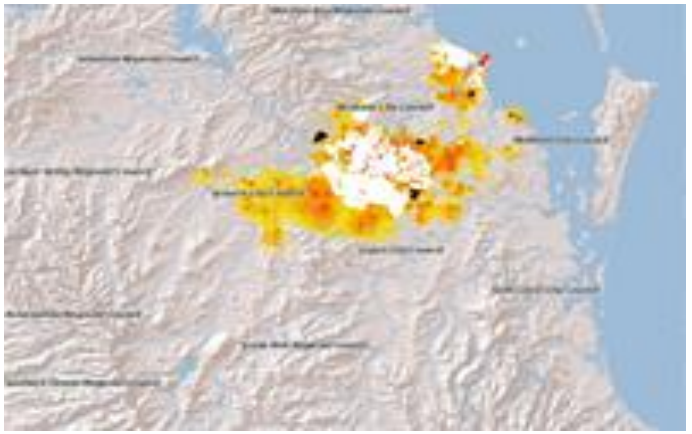
Two invasions



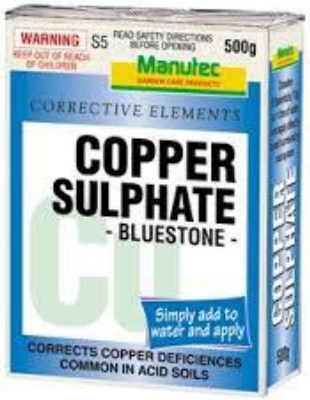
Black striped mussels in 3 Darwin marinas

Fire ants in Brisbane

Similar initial responses: treat known infestations



187 tonnes of bleach



7.5 tonnes of copper sulphate

White: Treatment Only
Black: Search or search + treat

Not much search.
Treat known infestations

Should similar strategies have been used?

- No, because they were not equally robust to key uncertainties
- The mussel eradication strategy was robust to uncertainty about treatment effectiveness:
  - Used lots of poison and monitored effectiveness continuously until almost certain it killed all mussels
  - Not robust to uncertainty about whether invasion had spread beyond marinas but not important: if had spread, eradication not feasible anyway, and probably unlikely because invasion was recent
- The fire ant strategy was not robust to uncertainty about how far invasion had spread but should have been since invasion old and delimitation failure could make eradication infeasible

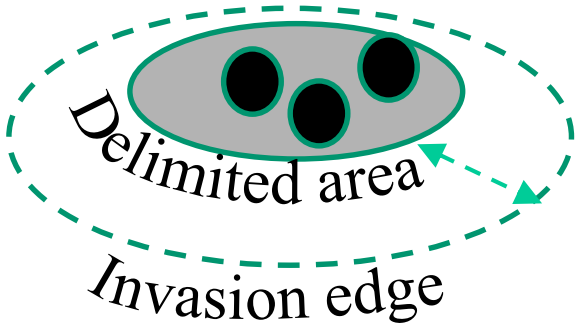
Key uncertainties and questions

- Will treatment remove all individuals in known infestations?
- Has the invasion spread beyond known infestations?
- If invasion did spread, can it feasibly be eradicated?

Differences between mussel and RIFA invasions

- Known mussel infestations: **new, small, probably contained**
  - Cheap to remove from 3 small marinas
  - Not much point searching/treating elsewhere because unlikely to succeed if mussels had escaped marinas
- Known fire ant infestations: **old, large, probably not contained**
  - No barriers as in marinas
  - Lots of time for spread to have occurred
  - Eradication still feasible even if ants spread beyond Port so why not search beyond known infestations?

Options to insure against model error



1. Underestimating how far out invasion has spread
    - Allocate % of budget to search further out
2. Underestimating how much spread occurred within delimited area
    - Allocate % of budget to search more/all of the delimited area after first treating/searching high risk areas

Tradeoffs to consider

- Allocating more of the budget to unquantified risks (eg that pests have spread further out than expected) reduces resources for addressing known threats.
    - Delays eradication or increases costs if the events we insure against (eg long distance spread) did not occur
    - How much extra WTP to insure against unquantified risks?

What forms of information to provide to decision makers?

- Traditional approach:
    - CBA, with a focus on cost of eradication without considering model uncertainty
    - If high discount rate relative to estimated rate of spread, spend less per year and delay eradication because deferred costs not worth much
    - But risky compared to earlier eradication with larger budgets

What forms of information to provide to decision makers?

- Types of information that might be useful
    - How much extra would it cost to ensure the invasion would be eradicated if fire ants existed within 1km beyond the estimated edge?
    - Estimate incremental costs for progressively larger invasion areas
    - Repeat analysis to estimate cost of searching progressively larger proportions of land wityhin the delimited area.