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## **Increasing the Robustness of Invasive Species Eradication Programs**

Daniel Spring, Tom Kompas

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Canberra, ACT, 2-5 February 2016

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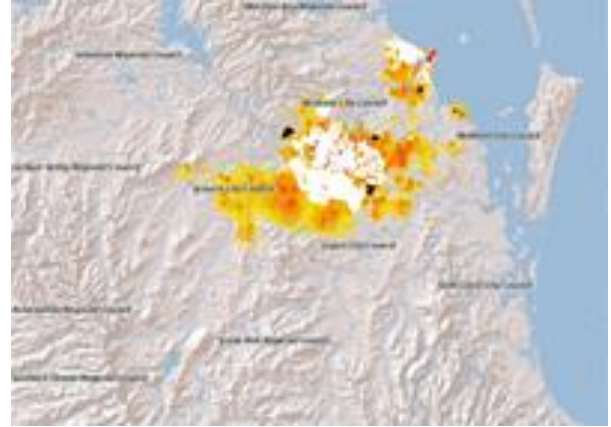
# *Increasing the Robustness of Invasive Species Eradication Programs*

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## *Two invasions*

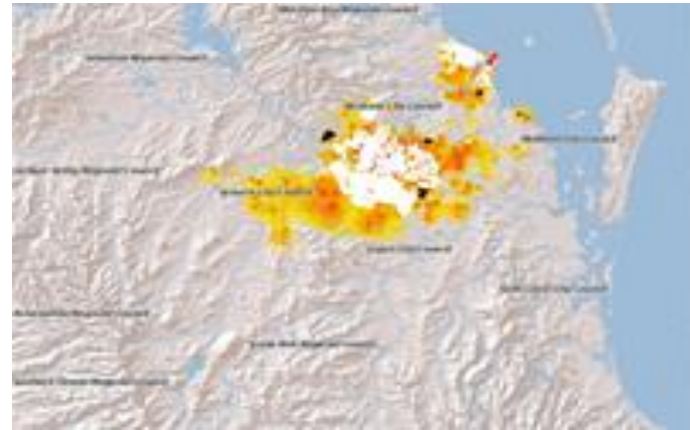


**Black striped mussels in  
3 Darwin marinas**



**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 within the delimited area.