Risk assessment approaches for log exports

S. Pawson, C. Romo, N. Meurisse, M. Bader, E. Brockerhoff
O. Woodberry and A. Nicholson
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What is the situation?

- New Zealand exports $> 12M \text{ m}^3$ of logs
- Predominantly *Pinus radiata*
- Largely to China, India, Korea and Japan
What is the problem?

- Four key high risk phytosanitary pests in NZ.

*Arhopalus ferus*

*Prionoplus recticularis*

*Hylastes ater*

*Hylurgus ligniperda*

*Sirex noctilio* is considered a low risk pest, however it is of concern to trading partners.
How do we currently mitigate the risk?

• Our trading partners require us to treat logs prior to export:
  – Methyl bromide is an accepted treatment
  – Debarking and heat are accepted in some markets, but current methods are not cost effective.
  – Phosphine is allowed for the Chinese market under an experimental use permit.
How to reverse the trend in MeBr use?
Our proposed new paradigm

Only treat commodities when a phytosanitary risk is present

Integrated Phytosanitary Pest Management
Integrated Phytosanitary Pest Management (IPPM)

Pest complex and its distribution

Thermal development models

Pest Pressure at a given time and at a given place, e.g., Harvest area

Reduce reinfestation

Dispersal
- How far they fly
- Conditions required for flight
- Time of day

Landscape context
- Amount of plantation
- Age of source material

Probability of infestation
Do we treat – fumigate or heat etc
Modelling Approach

Potential sink population prevalence (GIS 1.3.5)

Source population prevalence (BN 2.2.3)

Source population prevalence (GIS 1.3.3)

Flight conditions (GIS 1.3.2)

Local population prevalence (GIS 1.3.6)

Mature adults (GIS 1.3.1)

Pest infestation rate (BN 2.3.1)

Pest infestation rate (DB 1.4.1)

Temperature dependent development (GIS 1.2.1)

Temperature dependent development (BN 2.2.1)

Dispersal kernel (simulation 2.1.2)

Dispersal kernel (GIS 1.2.2)

Deadwood (GIS 1.2.3)

Deadwood (script/BN 2.2.5)

Forestry history (log tag DB 1.4.2)

Forestry history (GIS 1.1.4)

Forestry history (GIS 1.1.6)

Pest distribution (GIS 1.1.5)

Temperature dependent development (GIS 1.2.1)

Dispersal kernel (simulation 2.1.2)

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Forestry history (log tag DB 1.1.6)

Forestry history (GIS 1.1.1)

Forestry history (GIS 1.1.3)

Forestry history (GIS 1.1.4)

Flight conditions (BN 2.2.2)

Activity (BN 2.2.4)

Mature adults (GIS 1.3.1)

Mature adults (GIS 1.3.1)

Activity (GIS 1.3.4)

Activity (GIS 1.3.4)

Potential sink population prevalence (script/BN 2.2.5)

Source population prevalence (BN 2.2.3)

Source population prevalence (GIS 1.3.3)

Potential sink population prevalence (GIS 1.3.5)

Potential sink population prevalence (GIS 1.2.5)

Local population prevalence (BN 2.2.6)

Local population prevalence (GIS 1.3.6)

Local population prevalence (GIS 1.3.4)

Log pest prevalence (script 2.3.2)

Log pest prevalence (DB 1.4.2)

Log batch pest prevalence (script 2.3.3)

Log batch pest prevalence (DB 1.4.3)

Forestry history (log tag DB 1.1.6)

Pest infestation rate (BN 2.3.1)

Pest infestation rate (DB 1.4.1)

Log pest prevalence (script 2.3.2)

Log pest prevalence (DB 1.4.2)

Log batch pest prevalence (script 2.3.3)

Log batch pest prevalence (DB 1.4.3)

GIS interfaces/databases in blue

Simulations in pink

BNs
Deadwood simulation and dispersal to characterise pest abundance
Local population prevalence (time-integrative GIS) (per species)

Potential sink population prevalence
(script/BN 2.2.5)

Activity
(BN 2.2.4)

Flight conditions
(BN 2.2.2)

Deadwood
(simulation 2.1.3)

Dispersal kernel
(simulation 2.1.2)

Meteorology
(GIS 1.1.1)

Forestry history
(GIS 1.1.3)

Topography
(GIS 1.1.2)

Pest distribution
(GIS 1.1.5)

Source population prevalence
(GIS 1.3.3)

Local population prevalence
(BN 2.2.6)

Mature adults
(BN 2.2.1)

Mature adults 
(GIS 1.3.1)

Pest infestation rate
(BN 2.3.1)

Pest infestation rate
(DB 1.4.1)

Pest infestation rate
(DB 1.4.1)

Fell coordinates

Fell time

Skid coordinates

Site coordinates and times for processing, storage and port

Log pest prevalence
(Script) (per species)

Log pest prevalence
(DB) (per species)

Log batch pest prevalence
(Script) (per species)

Log batch pest prevalence
(DB) (per species)

Fell time

Skid time

Log ID

Batch ID

Forestry history
(space and time explicit log tag DB)
Determining flight conditions
How will we define dispersal kernels?
Log logistics, how to track a log?
The Future

Pest complex and its distribution

Thermal development models

Pest Pressure at a given time and at a given place, e.g., Harvest area

Reduce reinfestation

Dispersal
- How far they fly
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Landscape context
- Amount of plantation
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Probability of infestation
Do we treat – fumigate or heat etc
The future