Identifying modelling approaches of Emerald Ash Borer invasions for Scotland's needs

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Introduction Bark beetles and wood boring insects such as the Emerald ash borer will be devastating to Scottish

Objectives

- Review scientific literature to assess mathematical modelling methods of bark beetle and wood borer infestation spread
- Find which models can be used to assess Scottish beetle infestations
- Determine which Scottish data is required to use uncovered methods
- Demonstrate the approach using Emerald Ash Borer



forestry, woodlands, and horticulture.

The nature of disease and pest invasions means mathematical or statistical modelling is the most cost effective means to monitor and predict the spread of any threat.

By reviewing the scientific literature we can find models that can be customised to Scotland's needs for any particular pest.

Project outcomes

• Found a number of modelling articles on the following species

• 107 articles on Mountain pine beetle -- *Dendroctonus ponderosae* • 78 articles on Eurasian spruce bark beetle – *Ips typographus* • 66 articles on Emerald ash borer (EAB) -- Agrilus planipennis • 1 article on Great spruce bark beetle – *Dendroctonus micans* • 40 articles on various *Dendroctonus* species • O articles were on Bronze birch borer – Agrilus anxius

- We focused on Emerald Ash Borer to illustrate the benefits of a review.
- We identified models that could be modified to fit Scotland's needs if there was an Emerald Ash Borer outbreak.
- We determined gaps in research important to Scotland.

We used Emerald ash borer (Agrilus planipennis) to demonstrate what a review can accomplish.

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- No articles investigated a potential joint Ash Dieback and Emerald Ash Borer scenario or impacts.
- No articles examined the potential susceptibility of monocultures of Ash to Emerald Ash Borer.



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Key messages

- Reviews can be used to highlight modelling frameworks for use in Scotland.
- We identified modelling studies for several high priority tree pests.

• We found modelling frameworks for Emerald Ash Borer that could be applied in Scotland with appropriate data.

We identified a lack of research into a simultaneous threat from Ash Dieback and Emerald Ash Borer.