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Preliminary investigation into the threat of Bronze Birch Borer (BBB - *Agrilus anxius*) to Scotland

Policy Summary

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Forest Research

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Policy Summary

Introduction

The bronze birch borer (BBB, *Agrilus anxius*) is one of the small but significant number of Agrilus beetle species that damages and kills trees. BBB is native to North America where it breeds in birch trees (*Betula* spp.) causing periodic damage and mortality, sometimes on a massive scale. Although all birch species are attacked by BBB, tree susceptibly varies between species. In North America, native birch species that have co-evolved with BBB are much more resilient to the beetle than non-native birch species. Eurasian birch species, including silver birch (*Betula pendula*) and downy birch (*B. pubescens*), are highly susceptible to BBB even when healthy, which has proved a limiting factor to planting these species in North America.

This project was undertaken to gather evidence to better assess the threat BBB poses to Scotland, as well as to inform risk assessment, surveillance and contingency planning, and to identify key risks and knowledge gaps. While considerable research has been undertaken to assess the threat that emerald ash borer (EAB, *Agrilus planipennis*) poses to Eurasian Ash (*Fraxinus* spp.), there has been less research on BBB. The latter is, however, thought to pose a greater proportional threat to Scotland than EAB, due to both BBB's cold climate tolerance and the importance and abundance of birch across Scotland. Assessments of BBB risk have been considered alongside that of EAB, as have management options. However, gaps remain in understanding the threat posed by BBB.

This project was divided into three sub-projects that each addressed a separate aspect of Bronze Birch Borer (BBB, *A. anxius*) risk and management.

- Sub-project 1 focused on the current UK distribution of native and established *Agrilus* species, plus the potential distribution of BBB were it to arrive in Scotland or elsewhere in the UK.
- Sub-project 2 investigated the possible pathways via which BBB might arrive in the UK, including identifying relevant stakeholders and assessing the risk levels associated with different pathways.
- Sub-project 3 tested the feasibility and efficacy of available BBB surveillance methods for use in Scotland.

Key findings & recommendations across sub-projects

Monitoring and detection

Most *Agrilus* species are thought to be under-recorded in the UK, especially those that exist in areas outside south England; it is not known how this would impact the detection of invasive species such as BBB. Feasibility tests of three different interception traps (all commonly used to monitor *Agrilus* species in North America) indicated no single trap type can be currently recommended over the others, as all tested have differing positive and negative logistical practicalities.

Recommendations:

- Targeted surveillance of *Agrilus* species in collaboration with beetle recording schemes, museum curators and individual recorders.
- Further testing and development of monitoring traps, in collaboration with North American researchers.

Pathways of introduction

There is low potential for BBB to survive the processes used to turn birch into pellets or chips for large scale biomass energy production use, and it is thus unlikely that BBB will enter Scotland via this pathway under current conditions of trade. Changes in biomass trade conditions may impact the likelihood of entry via this pathway. There remains high uncertainty around the characteristics of smaller pathways where unprocessed birch may be brought into the UK from North America, for example as part of the craft trade. Should BBB enter via trade pathways, birch in areas around major trading ports in South and South-East England may be vulnerable to first infestation. Beyond introduction, there remains a knowledge gap surrounding the volume and pathways of birch movements internally, within the UK.

Recommendations:

- Develop realistic policy and economic scenarios for use in trade modelling to reveal potential tipping points for large scale changes in processed or unprocessed birch into the UK.
- Investigations are required into the plausibility of small shipment volume pathways for entry of BBB, for example collaboration with North American researchers to monitor craft and ornamental birch items for emergence of insect pest species.

Understanding host-pest interactions

UK birch tree species are highly susceptible to BBB even when healthy. Distribution of birch trees is best estimated using species distribution models (SDMs), despite limitations due to inconsistent datasets. Our birch tree SDM predicted birch presence in East, West and South Scotland, and South and South-East England up to elevations of 675m. In North America, BBB is widespread and, although the lifecycle is temperature-driven, this does not appear to limit distribution.

Recommendations:

- Develop an improved birch tree species distribution model to include impacts of land management and land use change as well as coexistence of birch species with other tree species.
- Collaboration with North American researchers to link the existing North American BBB forecasting tool with an improved GB SDM for more accurate investigation of host-pest interactions.

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