Forestry Commission

Pest specific tree health contingency plan: Bronze Birch Borer (*Agrilus anxius*)

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The Forestry Commission is responsible for protecting, expanding, and promoting the sustainable management of forests, woodlands, and trees in England. Our work supports environmental resilience, biodiversity, and the long-term health of natural landscapes.

Our mission is to protect and enhance forests and woodland environments, ensuring they are resilient, sustainable, and able to support future generations.

The Plant Health Forestry team plays a key role in safeguarding the health of forests, woods, and trees across Great Britain. We focus on preventing the introduction and spread of harmful pests and diseases, particularly those associated with the movement of plants and wood products.

This publication is available at
https://planthealthportal.defra.gov.uk/pests-and-diseases/contingency-planning/

This contingency plan takes into account the environmental principles laid out in the Environment Act 2021. Of particular relevance are:

The prevention principle, which means that any policy on action taken, or not taken should aim to prevent environmental harm.
The precautionary principle, which assists the decision-making process where there is a lack of scientific certainty.

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Executive summary

Background	
Regulation	GB Quarantine pest
Key Hosts	*Betula* spp.
Distribution	North America (Canada, United States of America)
Key pathways	Plants for planting (except seeds bulbs and tubers), wood and wood products, non-squared wood, firewood
Industries at risk	Amenity, garden centres, nurseries, wider environment and forestry
Symptoms	Crown dieback, D-shaped exit holes on bark, branch dieback, host mortality
Surveillance	
Delimiting survey areas	Intensive area: 1km intensive Surveillance area: 10km linear
Surveillance activities	• Visual surveys will be carried out in the delimited survey areas • Pheromone and girdled tree trapping activities
Response measures	
Interceptions	• Consignment should be destroyed or re-exported if live or dead specimens are found, or feeding damage is seen • Tracing exercises to be carried out where required
Outbreaks	Measures, dependent on the outbreak situation, could include: • Movement and planting restrictions within the 50km regulated area • All *Betula* within 400m of infested trees to be felled and destroyed • Girdled trap trees and pheromone traps to be installed for monitoring
Key control measures	
Biological	N/A
Chemical	Insecticides can be used in exceptional circumstances
Cultural	Felling and destruction of infested trees
Declaration of eradication	
Eradication of an outbreak can be declared if no pest is detected during annual surveys for a period covering at least two lifecycles of *A. anxius* i.e. four years in the UK after the last infested material is detected and destroyed.	

Contents

1. Introduction and scope

1.1 This pest specific contingency plan has been prepared by the Forestry Commission (FC). It describes how the Plant Health Service in England will respond if an infestation of bronze birch borer (*Agrilus anxius*) is discovered.

1.2 The first version of the *A. anxius* pest specific contingency plan was prepared by the Forestry Commission in 2016 and revised in collaboration with Forest Research (FR) in 2026.

1.3 The plant health authorities in Wales, Scotland, Northern Ireland, and the Crown Dependencies have been consulted on the plan, and this plan will serve as a basis for the action they will take in the event of a suspected or confirmed outbreak of *Agrilus anxius* in their territories.

1.4 This document will be used in conjunction with relevant generic contingency plans (Defra Generic Contingency Plan for Plant Health in England (Defra, 2024), the Generic Contingency Plan for Plant Health in Scotland (Scottish Government, 2023) and the Generic Contingency Plan for Plant Health in Wales (Natural Resources Wales, n.d). These plans set out the roles, responsibilities and governance arrangements of the organisations involved in plant pest response. It also describes how these teams and organisations work together in the event of an outbreak of a plant health pest.

1.5 The purpose of this pest-specific contingency plan is to ensure rapid and effective responses to outbreaks of *Agrilus anxius*, to facilitate the containment and eradication of *Agrilus anxius*, and to make stakeholders aware of the planned actions. Throughout, mentions and comparisons with the closely related emerald ash borer (EAB, *Agrilus planipennis*) will be made.

1.6 This contingency plan falls into three main parts:

- Official action to be taken following the suspicion or confirmation of an interception of *A. anxius*
- Official action following the confirmation of an outbreak
- Background information about the pest

1.7 This contingency plan covers outbreaks of *A. anxius* in all situations where birch (*Betula* species) is planted or occurs naturally, i.e. forestry, natural and semi-natural habitats, agricultural landscapes, urban environments, parks and gardens. It is designed to help government agencies anticipate, assess, prepare, respond and recover from outbreaks of the pest.

1.8 This plan will be updated following new information, lessons identified from outbreaks of *A. anxius* or other pests, or changes in policy or contact details.

2. Objectives of this plan

2.1 To raise awareness in the event of an outbreak of the potential threats posed by *A. anxius*, and therefore, ensure that stakeholders are aware of how to identify the pest and the symptoms it causes.

2.2 To provide guidance on steps to be taken whenever the pest, or symptoms of attack by it, are observed or officially confirmed. The actions set out in this contingency plan provide a framework for response. Actions may be developed on the basis of this contingency plan and adapted, as necessary, to reflect local circumstances, the specific nature of the outbreak, and the most up-to-date technical and scientific evidence.

2.3 To ensure that infestations of *A. anxius* are managed promptly with the aim of meeting statutory objectives, including eradication.

2.4 To ensure that all relevant staff of the Forestry Commission, and personnel from other organisations within the Plant Health Authorities across GB, are conversant with the contents of this contingency plan so that effective and immediate action is implemented.

2.5 To ensure that good communications are put in place so that all stakeholders (including relevant media) are kept fully informed of the scale of infestation, both at regional and national levels.

3. Summary of threat

3.1 *Agrilus anxius* (Linnaeus) (Coleoptera: Buprestidae), commonly known as the bronze birch borer, is a specialist wood borer of *Betula* (birch) species.

3.2 Its native range covers North America, where it occupies a wide range of ecological and climatic conditions.

3.3 In its native range, it is mainly a secondary pest, attacking trees weakened by drought, old age, defoliation or soil compaction and temperature.

3.4 In many cases, tree death occurs within a few years after the appearance of the first symptoms.

3.5 Unlike birch species in the beetle's native range, Eurasian birch (*Betula pendula)* has not co-evolved with *A. anxius* and may be more vulnerable to attack, even when healthy and not otherwise stressed or declining.

3.6 *A. anxius* has an unmitigated and mitigated UK Plant Health Risk Register score of 100 and 50 respectively. Overall scores range from 1 (very low risk) to 125 (very high risk). These scores are reviewed as and when new information becomes available.

3.7 According to the European and Mediterranean Plant Protection Organization (EPPO) Pest Risk Analysis (PRA) for the pest (EPPO, 2021), the possible pathways of entry include the import of; woodchips, plants for planting, wood with or without bark, furniture and other objects made of untreated birch wood; from North America, where the pest is present.

3.8 It is officially absent from the UK.

4. Actions to prevent outbreaks

4.1 *A. anxius* is a GB Quarantine Pest (Annex 2 of the GB Phytosanitary Conditions Regulation 2019/2072) and is therefore prohibited from being introduced into, or spread within, GB. Further pest and host specific requirements are listed in Annex 7.

4.2 *A. anxius* is also a GB Priority Pest listed in the Annex of the GB Regulation 2019/1702, meaning it is a GB quarantine pest which has been assessed to have the most severe potential economic, environmental and social impacts to GB.

4.3 It is on the EPPO A1 list of quarantine pests with potential to cause extensive damage if introduced. Following suggestions from the National Plant Protection Organization (NPPO) of Norway, where *Betula* spp. comprise up to 30% of the woodland cover, a PRA for *A. anxius* was conducted by EPPO and the pest was added to the EPPO A1 list and is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072.

4.4 The UK Government contributed to the EPPO PRA on the species (EPPO, 2021).

4.5 Overall, the PRA concluded that while the probability of entry is relatively low, should the pest arrive in the United Kingdom, it would have a high probability of becoming successfully established. Containment and eradication would be difficult and spread would be likely given the pest's strong flying ability. Given the increased susceptibility of European birch species to attack compared with North American birch species, it is expected that the pest would have major economic consequences, further exacerbated by the pest's broad climatic range.

4.6 Importation of birch wood from North America has been controlled since October 2014 (Appendix 1).

4.7 A list of all the relevant legislation which might be pertinent in an *A. anxius* outbreak is given in Appendix 3: Relevant legislation.

4.8 EPPO revised a quarantine pest data sheet for the organism in 2020 (EPPO, 2025).

4.9 Official surveillance to support pest-absence reporting and facilitate early detection is completed annually. Forestry surveillance led by Forestry Commission includes trapping and visual inspections for *Agrilus* species on target hosts including birch. Identification of trapped *Agrilus* species is performed morphologically by Forest Research entomologists at the Holt Quarantine Facility, Alice Holt, with genetic confirmation where required.

5. Response activities

5.1 The key indicators that would trigger a response are findings or reports of:

- the presence of characteristic D-shaped exit holes, or other signs of infestation, on *Betula* spp. (Birch) in a nursery or the wider environment; or
- a live or dead insect found in a consignment of wood or wood packaging material, dunnage or live plants; or
- a live or dead insect found in wider environment surveillance networks (e.g., discovered by amateur entomologists, trapping at ports and processors, trapping within woodlands etc.).

5.2 The initial report could come from nursery owners, arboriculturists, woodland owners or managers, professional survey staff (FC, APHA, etc.), members of the public, or government officials.

Official action to be taken following the suspicion or confirmation of an interception of *A. anxius*

5.3 If *A. anxius* is suspected by Forestry Commission or the Plant Health and Seeds Inspectorate (PHSI) to be present in a consignment moving in trade, the PHSI or FC must hold the consignment until a diagnosis is made, under a containment notice. Samples should be sent to Forest Research, Alice Holt Lodge, Wrecclesham, Farnham, GU10 4LH (0300 067 5600) or Fera Science Ltd., Plant Clinic, York Biotech Campus, Sand Hutton, York, YO41 1LZ (01904 462000), in line with the guidance in section 5.22 (sampling).

5.4 In instances where either live or dead insects or signs of live or dead insects are strongly suspected or confirmed in a consignment at a border, the inspector shall determine the level of plant health risk in the circumstances taking into account the weather conditions, the time of year and the likelihood of the pest escaping, and order the appropriate remedial action. This may involve, if possible, the reloading of material back into the freight container and closing the doors, or requiring the consignment be covered to prevent insect escape.

5.5 If intercepted inland, ideally, any host plants (*Betula* spp.) should be surveyed on the site or in the immediate vicinity, initially. Until further investigation, and under a containment notice, no host or other suspect material shall leave the site. Local

operations associated with tree management will be halted until the suspected case is investigated. The extent of the site under containment will be determined by the Incident Management Team.

5.6 If the finding can be linked to any traded plants or wood, tracing forwards and backwards to identify suspect material will be conducted and, if the pathway is known, to identify other potentially contaminated stock or sites. This will include suppliers of plants, wood and wood products, propagators and wholesalers.

5.7 When an infestation of *A. anxius* is confirmed, the PHSI or FC should advise the client of the action that needs to be taken by way of an official notice. The consignment should be destroyed by either wood chipping (to ≤1.5cm in three dimensions), incineration or deep burial.

Strategic actions to be taken following the suspicion or confirmation of an *A. anxius* outbreak

5.8 The immediate investigation phase covers the notification and escalation of an outbreak and the initial investigation of the outbreak to determine its extent and seriousness. Suspect outbreaks will be assessed on a case-by-case basis.

5.9 If an outbreak is suspected, an FC or PHSI inspector will notify the Chief Plant Health Officer (CHPO), or deputy, who may decide to convene an Outbreak Triage Group (OTG) if considered to be significant enough. The OTG will comprise plant health officials and subject matter advisors. The UK Plant Health Service should be informed of suspected outbreaks to ensure appropriate awareness and coordination across the UK.

5.10 Along with the implementation of restrictions and measures (e.g., initial restrictions on the movements of susceptible material from the affected area – see 5.13-5.14), the FC inspector should gather as much information as possible to provide a basis for further decision making and reporting to the OTG including: the location, likely origin, host or commodity, level of damage, extent of outbreak and chance of spread. This intelligence gathering process should incorporate the completion of a plant investigation form to be presented to the OTG.

5.11 The OTG will nominate the Control Authority (e.g., Forestry Commission), and the Control Authority will then appoint an Incident Controller to take on overall responsibility for managing all activities relating to the outbreak. An Incident Management Team (IMT) meeting, chaired by the Incident Controller, will subsequently convene to produce an Incident Action Plan (IAP) to outline the operational plan.

5.12 The OTG will set an alert status, which will take into account the specific nature of the outbreak. These alert levels, in order of increasing severity, are white, black, amber and red (more details of these levels can be found in Table 2 of the Defra Generic Contingency Plan for Plant Health in England).

Restrictions on movement of material

Wood and wood products, including wood packaging material

5.13 If *A. anxius* is suspected to have emerged from wood, wood products and wood packaging material (WPM) at an inland site, all the WPM from the same consignment should be placed under official control pending further investigation.

Nursery, orchard or garden centre

5.14 If *A. anxius* is suspected at a nursery, orchard or garden centre, all suitable woody plants and other suspect material should be placed on hold pending further investigation.

Wider environment

5.15 If breeding *A. anxius* is suspected in a tree, the movement of susceptible plants and wood material outside a defined radius, typically 50km, unless evidence indicates otherwise, should be avoided, pending further investigation. This measure is provided as guidance and may be revised in accordance with the findings of the investigation and the most up-to-date technical evidence.

Preliminary trace forward/backward

5.16 If an infested consignment or tree is considered as being the source of the suspect outbreak, investigations regarding the origins of infested consignments will be undertaken to locate other related and therefore potentially infested consignments or plants moving to and from the site. Information should also be obtained on the destination to which suspect consignments have been sent. For findings in the wider environment, where no trace forward or backward can be done, the most likely source should be identified and investigated.

Confirming a new outbreak

How to survey to determine an outbreak

5.17 An outbreak of *A. anxius* might be detected as a result of surveys carried out following an interception of live or dead life stages in wood or wood packaging material, dunnage or an imported plant. Perhaps more likely, an outbreak could be detected through general surveillance or following a report from the public of birch trees showing canopy thinning, dieback or mortality, with suspect insect galleries and damage beneath the bark (Appendix 1).

5.18 Confirmation that *A. anxius* is present will require expert examination of samples and follow-up inspections. The presence of D-shaped exit holes and larval galleries under the bark are two key indicators of the presence of *A. anxius*. Though there are other UK native species that make D-shaped exit holes, some of which have been found rarely on birch (e.g., *Agrilus viridis*), the presence of D-shaped exit holes on birch would warrant follow-up investigation in any case, given the threat posed by *A. anxius* (and other non-native birch-feeding Buprestidae e.g., *Chrysobothris*).

5.19 If there is evidence of the presence of *A. anxius,* then follow-up inspections in line with ISPM 6 (guidelines for surveillance) should gather information about:

- the likely origin of the pest and, if a consignment of plants or plant products including wood and wood products is suspected to be the origin of the outbreak, details such as other destinations;
- the geographical location and ownership of the affected site, including any other factors which might influence the outbreak, e.g., public access, transport routes, etc., including detailed maps;
- hosts infested at the site (species, variety, development stage, etc.), and an estimate of the abundance and distribution of potential hosts in the surrounding area;
- when and how the pest was detected and identified (including photographs of symptoms);
- the level of pest incidence and, where appropriate, life stages present;
- the extent and impact of damage (including the part/s of host affected);
- recent import or movement of host plants or host plant products (*Betula* spp.) into and out of the affected site;
- movement of people, products, equipment and vehicles, where appropriate;
- accessibility to the site for machinery to remove trees;
- relevant treatments applied to host plants (*Betula* spp.) that may affect the development of symptoms, or detection and diagnosis of the pest;
- the history of the pest at the site or place of production, or in the area; and
- likely biodiversity impacts of any control measures, including any duty of care obligations under the Natural Environment & Rural Communities (NERC) (2006) Act.

5.20 Further to information gathering, surveys of other host plants and host wood (*Betula* spp.) should be carried out to confirm the extent of the infestation e.g., in surrounding gardens, parks etc. This initial survey will be used to determine if it is an isolated finding or an established outbreak. For example, where an adult beetle is found but no associated infested host plant is located following the survey, the outbreak will be treated as an isolated finding, as there is no evidence to suggest the pest has become established.

5.21 These surveys should be conducted by a Plant Health or Tree Health Officer or, in the case of a finding on a nursery, a PHSI inspector. This information should be included on the plant pest investigation template (see 3.22 of the Defra Generic Contingency Plan for Plant Health in England for an example).

Sampling

5.22 In order to confirm a suspected *A. anxius* detection, it is important that a sample of the insect and the infested plant/wood material be collected for expert identification. Adult specimens are most useful for rapid identification, but any life stages present should be collected. A representative sample of the infested plant or wood product should be obtained, along with a sample of any attached foliage and bark, if present, to help confirm the identity of the infested material. Samples from infested plant material, including wood and wood products, should be either:

- Triple-wrapped and sealed in robust plastic bags; or
- Double-wrapped in robust plastic bags and the bags placed inside a secure box or vial and sent immediately for diagnosis. Suspect insects should be preserved in alcohol or glycol and sent in a similar manner.
- Damaged eggs, larvae or pupae should be submitted in tubes of 100% ethanol or 100% propylene glycol to prevent further degradation and facilitate molecular diagnostics.
- The samples must be accompanied by information about the date when the samples were collected, the location (address, postcode, GPS) and contact details of the person collecting the samples.
- Once secure, samples should be sent for diagnosis as soon as possible. For border and inland interceptions, and samples from forest settings, the address is: Tree Health Diagnostic & Advisory Service, Forest Research, Alice Holt Lodge, Gravel Hill Road, Wrecclesham, Farnham, Surrey, GU10 4LH. For nursery interceptions, the address is: Fera Science Ltd., Plant Clinic, York Biotech Campus, Sand Hutton, York, YO41 1LZ.
- Samples should only be removed from the site by trained individuals using safe and appropriate equipment and operating according to biosecurity guidelines.

Diagnostic procedures

5.23 Positive identification of *A. anxius* is based on morphological characteristics and/or DNA sequencing of adults, larvae or pupae. That said, the available number of sequences to support molecular methods is low, and there are similarities with sequences from another species found on birch in North America, *A. pensus* (EFSA *et al*., 2020). Further work is needed to establish molecular methods of identification for this species.

5.24 Detailed keys for beetles in the genus *Agrilus* native to North America are generally lacking. Adults of *A. anxius* can be identified using the keys provided in Fisher (1928), with descriptions in Paiero *et al*., (2012), and by comparing these sources with the taxonomic keys for *Agrilus* species that occur in the UK and Europe (e.g., Duff, 2020; Hackston, 2019). Parsons (2008) produced a guide for distinguishing morphologically similar species from *A. planipennis*, including *A. anxius*.

Criteria for determining an outbreak

5.25 An outbreak of *A. anxius* should be declared if there is evidence of a breeding population within host trees. For example: an adult beetle and an associated fresh exit hole is found on a mature tree.

5.26 The discovery of live or dead life stages found on; imported birch wood, waste wood, wood packaging material, or plants for planting - and *where there is no risk of spread* - is likely to be treated as an interception. Such a finding would not automatically trigger an outbreak response but should be followed up with a trace forward and backward exercise, possibly resulting in a local survey of trees and woodlands to provide further information about the location of specimens, numbers of individuals etc., at which point the criteria in section 5.7 may apply.

5.27 There could be a number of situations and the OTG would make a final decision on whether a finding is classified as an interception, incursion or outbreak.

Official action to be taken following confirmation of an outbreak

5.28 The identification of *A. anxius* following formal diagnosis will inform what action should be taken, with respect to demarcation, surveillance, and management.

5.29 The scale of the outbreak will determine the size and nature of the IMT.

Communication

5.30 The IMT will organise details to be communicated https://www.ippc.int/en/publications/606within Government to Ministers, senior officials, other government departments, devolved governments, and agencies (e.g., the Environment Agency) on as regular a basis as is appropriate; and to stakeholders. Defra will assess the risks and communicate details to the IPPC and EPPO, in accordance with EPPO pest reporting standards.

5.31 A generic communications plan is available for use across all plant health outbreaks. This will be owned by Defra and FC communications teams and is intended to provide consistency across outbreaks. This plan aligns with the internal and external communications section in the Defra Generic Contingency Plan for Plant Health in England and can be tailored to the outbreak, using pest and outbreak specific information. It includes a list of key stakeholders and templates for:

- Core narratives
- Press releases
- Reactive lines
- Frequently asked questions

5.32 Prepared materials to support surveillance of *A. anxius* are available from the Observatree website. These include a field identification guide, an awareness poster, and a birch pest and disease information sheet. A pest profile summary is also available from Forest Research.

Demarcation

5.33 A demarcated area (Figure 1) should be established as soon as possible after the discovery of an outbreak of *A. anxius*, to help minimise spread of the pest within the infested area of 400m, based on Mercader *et al*. (2009, 2012) and to prevent human-assisted transport to areas outside the infested area.

5.34 An initial buffer zone of approximately 50km radius around the infested trees should be considered, within which measures to minimise the movement of potentially infested birch material are recommended. Such measures may include restricting the movement of untreated birch wood (including firewood, round wood, sawn wood, wood chips, waste wood and arboricultural arisings) and birch plants for planting. Any restrictions should aim to limit the movement of potentially infested material from the immediate infested area (e.g., the 400m zone) to the remainder of the demarcated area, and from the demarcated area to locations beyond, with measures applied proportionately and in accordance with the latest scientific advice.

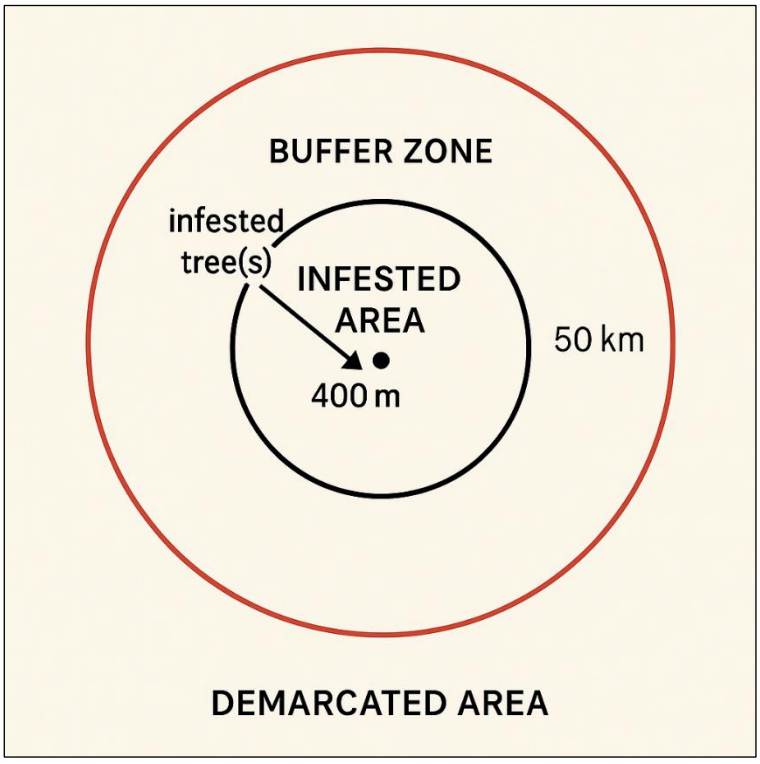

Figure 1: Suggested demarcated area for *Agrilus anxius* outbreak containment

5.35 Subsequently, the size of the buffer zone may need to be adjusted - typically increased if *A. anxius* is detected in previously uninfested areas or reduced where after monitoring and investigation a previously infested area is found to be free of *A. anxius* or host material.

5.36 The demarcated area should be adjusted in response to further findings. If *A. anxius* is found within an area outside the demarcated area, this area should subsequently be designated as infested.

5.37 FC or PHSI will contact garden centres, nurseries and other traders of host plants (*Betula* spp.), as well as owners/managers/tenants of woodland areas, conservation areas and amenity land such as parks, within the demarcated areas to inform them of the requirements that will apply to them.

5.38 Controls on the movement of specified plants or wood will be implemented either by statutory plant health notices, or by a demarcated area notice, or a combination of the two, depending on the nature and scale of the incident. The location of any demarcated areas will be published on 'gov.uk' in order to inform all other stakeholders (including residents, businesses and landowners) within the demarcated areas of the requirements that will apply to them.

Tracing forwards/backwards

5.39 Depending upon the confirmed pathway(s) of entry, tracing forwards and backwards to identify suspect material will be conducted to identify other potentially contaminated stock or sites.

Surveillance to delimit the outbreak

5.40 A delimiting survey should be set up as soon as possible after the first finding of *A. anxius* to determine the geographic limits of the infested area and to demarcate a regulated area. The methodology described here is provided as initial guidance and may be modified or refined in response to emerging information, local circumstances, or the latest scientific advice. For guidance on survey methodology, the two principal elements of the delimiting survey are outlined below. There is currently no formal survey protocol for *A. anxius* in England, and this methodology should therefore be regarded as a first version based on the best available guidance. Different approaches have been used to assess the spread of the closely related emerald ash borer in North America and Russia; in both regions, the pest has become well established, and eradication is no longer considered feasible.

For guidance, the two principal elements of the delimiting survey are outlined below:

- an **intensive survey** of all birch trees outwards to at least a 1km distance from the first tree(s) found to be infested, or where adults appear to have escaped into

the wider environment. This should include all birch wood, derived from both small and large material, and live plants with a stem diameter ≥1.5cm; and

- **line transects** outwards to at least 10km, along which visual inspection and destructive sampling of birch trees is carried out at regular intervals (e.g., every 50-100m) to estimate the full extent of spread. Using transects will indicate spread of the pest from the point of the outbreak, but the number of transects needed and their orientation will depend on the distribution of birch within the 10km zone. This will need to be determined on the ground (to include garden and hedgerow trees) and using available data from the National Forest Inventory, and if in Scotland, the Native Woodland Survey of Scotland.
- **additional trapping and surveillance** may also be conducted in the wider environment, beyond the 10km zone, to help determine whether the detected population is isolated, or whether additional populations may be present.

5.41 The surveys should pay particular attention to open-grown birch trees and those growing along the edges of woodlands, and should include the inspection of previously cut trunks and branches, cutting residues, and naturally occurring debris showing signs of beetle activity. Samples of birch trees showing canopy thinning and dieback should be felled, and the bark removed to look for galleries and immature life stages. Apparent healthy trees might also be infested with *A. anxius,* and these will therefore also require checking for the presence of the pest. This should be approached in a standardised manner, e.g., by removing two branches of 5–8cm diameter from the mid-crown of each tree and peeling the bark from the first 50cm above the base of the branches to look for larval galleries (Ryall *et al*., 2010, EFSA *et al*., 2020).

5.42 Who should conduct such surveys will be determined by the IMT/management team and will depend on the location and distribution of birch in the area. It will be necessary to confirm and record the location and distribution of birch in the area during surveys and survey planning.

5.43 If more trees are found to be infested, the surveys should be extended so that the intensive survey covers all birch trees out to at least 1km from the new infested trees, and the line transects extend a full 10km from the new infested trees. This process should be continued to provide a preliminary assessment of the infested area. A survey on such a scale will be a huge commitment of resources, and advanced planning should reflect this.

5.44 Records on surveys should be kept and updated within the Local Incident Action Plan.

Management strategy

5.45 The management response will be determined by the IMT and will consider factors including how many trees are found to be infested, whether adult beetles have

emerged, how many generations the pest may have completed, the distribution of the infested birch trees, and how many birch trees are present in the surrounding area. Additional guidance to inform management decisions are set out in Appendix 2 – note this is guidance only and each outbreak or finding will be considered on a case-by-case basis.

5.46 Various qualifying factors also need to be considered when deciding on the most appropriate course of action (see Appendix 2).

Pest management procedures

Surveillance

5.47 Following a finding of BBB, if no infested birch trees are discovered during the initial delimiting survey, there is no evidence of breeding and there appears to have been no possibility of spread, then the subsequent management strategy is best served by a moderate programme of surveillance. Consisting of annual repeat surveys of the original 1km intensive survey zone, combined with trapping for adult beetles and, perhaps also, the use of girdled trap trees (see 5.56). These follow-up surveys should be carried out annually and continue for at least two full beetle life cycles, which equals around four years in total.

5.48 If the initial delimiting surveys do not find any infested birch trees, but there is a high likelihood that adult beetles have spread into the wider environment, then a more rigorous programme of surveillance will need to be put in place. This should involve repeating the intensive surveys outwards to 1km and the line transect surveys to 10km in the following and subsequent years, and the establishment of a network of traps and girdled trees (sections 5.56, 5.57). The numbers of traps and girdled trees, and their placement, will depend on the abundance and distribution of birch in the surrounding area (see Appendix 2, Table 1: Factors to consider when developing a management strategy and operational procedures). These follow-up surveys should be carried out annually and continue for at least two full beetle life cycles (i.e., 4 years).

Eradication

5.49 If the initial delimiting surveys detect infested birch trees, then the decision either to attempt eradication or concentrate on slowing the spread of the pest and reducing its impact, will depend on whether adult *A. anxius* have emerged from the infested trees and how long the beetles have been present (see guidance in Appendix 2). Where no adult beetles have emerged, or if only one generation of beetles has emerged and their ability to spread appears to have been limited, then eradication may be possible, and management should focus on this objective. An infestation confined to a small group of trees in an area where there are generally few birch trees is more likely to be eradicated than an infestation affecting a larger number of trees dispersed across

a wider area, especially if there are large numbers of other birch trees in the surrounding wider environment (Appendix 2). Determining how many generations of beetles may have emerged and how far they might have spread will require detailed examination of the infested trees by entomologists familiar with wood-boring and bark-feeding insects.

5.50 Actions focused on eradication may include the following measures. These are provided as initial guidance and may be adapted to reflect local circumstances, outbreak characteristics, and the latest scientific evidence:

- **felling and destroying (chipping/burning) all birch trees** outwards to at least 400m of the infested trees, based on Mercader *et al*. (2009, 2012) who found that 90% of the closely related EAB larvae were found within 100m of the point where adults emerged in newly established satellite populations, 98% of larvae were found within 200m, and only a very small number of larvae (<1%) were found up to and beyond 400m from the point of adult emergence. Chipping has been shown to be an effective biosecurity measure for the disposal of infested trees for *A. planipennis* (McCullough et al., 2007). Based on the findings of this paper and theoretical application to *A. anxius* chip size should be controlled to ≤1.5cm in all three dimensions to ensure thorough destruction of pupae, in light of the threat posed by *A. anxius*. However, the effectiveness of this recommendation should be confirmed experimentally, to ensure it is relevant to *A. anxius.*
- **the use of girdled trap trees**: girdled birch trees are highly attractive to adult *A. anxius*, with traps placed by such trees attracting significantly more adult beetles (Silk *et al*., 2020). A series of girdled trap trees spaced at regular intervals within and around the outbreak would attract and kill a large number of beetles. The girdled trees would have to be felled and destroyed soon after the adult flight and oviposition period to be sure they are not acting as breeding material.
- **traps for adult beetles:** un-baited (i.e., with no pheromone attractant) green sticky prism traps can be used for this species (Silk et al., 2020). However, traps are less effective when populations are low and generally, they are more useful for monitoring purposes rather than as a means of reducing the population.

5.51 If the infested trees are found during the beetles' flight period, they should ideally be removed and destroyed as soon as practicable to limit adult emergence and dispersal (Appendix 2), while allowing sufficient investigation to determine how long the beetles have been present and where they might have spread. Outside the flight period, (October to the end of March), trees may be felled and removed at any time, although earlier is preferable. All of the infested trees should be cleared and destroyed prior to the start of the next flying period (i.e. before the beginning of April), subject to local site conditions and operational constraints.

5.52 A clear policy of who will carry out and pay for tree felling and removal, whether it is the responsibility of the landowner or occupier, the local authority, or FC, APHA or Defra, will need to be established by the Lead Government Department as soon as practicably possible after the outbreak is discovered and before tree felling commences. The removal of host plants will typically remain the responsibility of the occupier or other person in charge of the premises. Contact information for the Arboricultural Association with their register of qualified tree surgeons and ConFor (Confederation of Forestry Industries) will be provided to enable landowners to identify qualified operatives to carry out removal work. In exceptional circumstances, the removal of trees may be carried out by the PHSI or FC.

5.53 In the case of private householders, officials may agree to organise the felling and removal of host trees and shrubs, with responsibility for payment of costs remaining with the occupier or other person in charge, or for it to be undertaken by the relevant local authority which will be responsible for determining whether to accept responsibility for the costs of the work or seek recovery. Exceptionally, officials may, in the interests of speed, have to arrange for the work to be carried out and bear the cost, where possible seeking recovery after the event.

5.54 Trees should be cut as close as possible to ground level and the trunks and branches cut into sections of a size that can be easily handled, turned over, and examined by inspectors before disposal. The outside of the logs and cut ends must be examined for any signs of *A. anxius* damage, and the bark removed from the basal 50cm of at least two branches per tree to look for galleries and immature life stages. The location of each infested tree should be recorded, so that the spatial distribution of infestation can be mapped, and samples of infested material or suspect material should be retained for examination in the laboratory. Samples must be transported within three layers of containment and the laboratory facility receiving the samples must hold a licence for working on *A. anxius* material (section 5.22).

5.55 In the following year, intensive surveys and trapping from 400m to 1km (i.e. from the edge of the clear-felled area to the boundary of the designated infested area), and trapping and systematic surveys outwards to 10km, should be repeated to confirm there has been no further spread, or, if more infested trees are discovered, to redefine the infested area and the boundaries of the regulated area. If more infested trees are discovered, then these and all other birch within a radius of 400m should be felled and removed, as detailed above.

5.56 This process must be repeated on an annual basis for a minimum of two beetle life cycles (4 years) after the last infested trees have been removed and there have been no further signs of breeding, at which point the infestation may be declared as eradicated, or it may continue for a longer or shorter period depending on whether newly infested trees continue to be found and the pest continues to spread, in which

case a change of policy from eradication to slowing the spread may be required (section 5.59).

5.57 Traps designed to capture adult *Agrilus* species, including *A. anxius*, have been developed in the USA and Canada, and a network of traps across the infested and regulated area will help to monitor occurrence and spread. Green multi-funnel traps, and both green and purple sticky prism traps, have been shown to have some efficacy in capturing *A. anxius*, though overall, the literature points to trapping being reasonably ineffective for this species (EFSA *et al*., 2020). Lures (such as those used for EAB trapping) have no proven effect for this species – instead, girdling of birch trees in the area where the trap is placed, and consideration of trap placement, are more important to maximise trap captures (EFSA *et al*., 2020). However, given the increased susceptibility of Eurasian species of birch to attack by this pest (EPPO PRA, 2021), girdling of trees may not be necessary to successfully induce attack. Traps need to be placed in a sunny, exposed position (normally on the south-western side of trees).

5.58 Girdling is carried out in spring or early summer by removing a 15-20cm band of outer bark and phloem around the base of the tree, and is followed by felling and debarking in the autumn or winter to detect larval galleries. The primary objective of girdled trees is for use as volatile sources to improve trap catches; however, some oviposition may still occur on them during the trapping period. Thus, the trees must be felled and destroyed before the start of the next flight period. Small or medium-sized trees (10-20cm DBH) are optimal in terms of being easier to girdle and inspect.

Slowing the spread and reducing impacts

5.59 If there is evidence that a larger number of birch trees have been attacked over a wider area, e.g., an area larger than 100 x 100m, and more than one generation of adult beetles has emerged and dispersed, then eggs are likely to have been laid into birch trees at distances of more than 1km from the initial focus of infestation, and these infested trees will be extremely difficult to locate. *A. anxius* is a capable flyer able to make long-distance flights of more than 1km (EFSA *et al*., 2020). Though studies are lacking for this species, studies on the closely related and similarly sized EAB have shown that, in flight-mill experiments in the laboratory, individual adult females have been shown to fly 9-10km over a period of several days (Taylor *et al*., 2010), and in an intensive quarantine area in the USA, Sargent *et al*. (2010) recorded an average dispersal distance per year of 1.4km. From this, we can infer that once more than 1-2 generations of the adult beetles have emerged, clear-felling birch outwards to a distance of 400m, or even to 1km, is very unlikely to result in eradication or prevent further spread.

5.60 Note that rates of spread may be lower in areas with a cooler climate, such as northern England and Scotland (Appendix 2). However, climate change and the associated

extremely warm summer events are likely to benefit *A. anxius* and rates of spread may increase in such years.

5.61 The general advice (based on experience in North America with EAB) is that clear-cut areas will not ultimately prevent spread, except perhaps in the very earliest stages of an outbreak. It could also remove resistant birch genotypes which might otherwise survive. In addition, cutting large numbers of infested or potentially infested trees reduces the resources available locally to the pest, and therefore might stimulate spread further afield.

5.62 Therefore, if the infestation is more extensive and more than one generation of adult beetles has emerged and dispersed, the management programme should focus on monitoring and the phased removal of the worst affected birch trees, to reduce the *A. anxius* population and slow the rate of spread, particularly during the flight period. In the USA, this begins from late April to August, depending on the temperature in the region, and lasts between 10 and 12 weeks (this period may be later in the cooler summer conditions of the UK). By removing only the worst affected trees, this strategy avoids destroying birch that might be resistant to *A. anxius* and will also help to maintain populations of natural enemies (parasitoids, predators & entomopathogens) that may provide considerable control of the pest's population in the longer term.

5.63 Under a slowing-the-spread strategy, therefore, as soon as possible after an outbreak is discovered, and at least annually thereafter, all birch trees within the known infested area should be assessed during mid to late summer for canopy thinning and dieback, e.g., by using the scale illustrated by Smitley *et al.* (2008) for ash under EAB attack. All trees with more than 50% canopy thinning should be felled and the material chipped to ≤1.5cm in three dimensions and/or burned. (Note that burning should not normally exceed 10 tonnes per 24-hour period, according to Environment Agency and SEPA regulations, and a specific dispensation will be required if larger quantities of material is required to be burnt; section 5.72). Trees that are felled should be inspected to confirm whether *A. anxius* is present, and this information should be recorded to help monitor spread.

5.64 Annual surveys will be required to monitor the spread of *A. anxius*, to redefine the infested area and the boundaries of the regulated area, and to identify birch trees with more than 50% canopy thinning. Surveys of canopy thinning and dieback would need to be carried out during mid or late summer, although surveys at other times of the year can be useful for identifying heavily infested trees. Trees marked up in the summer may be felled during autumn or winter.

5.65 Assessing trees for canopy thinning and dieback can be based on visual, ground-based surveys, or using drones. Girdled trees and their associated traps (see 5.58, 5.59) could also be used to detect the presence of beetles in areas outside the known

infested area, which would provide advance warning that regular surveys and tree removal might soon be required.

5.66 Chemical insecticides can be effective in killing larvae, pupae and adults of *A. anxius*, but they are not recommended for control. The possible use of any chemical insecticide treatments will be considered by the IMT for trees in the infested zone (see Appendix 2).

5.67 The opportunity to conduct research on surveying methodology alongside the management/monitoring work should be taken where possible, given the current lack of information on surveying for this species in a European context on European birch. Such information is crucial for slowing the spread, as well as informing other work on surveying for pests such as EAB.

Disposal plan

5.68 Birch trees felled to reduce *A. anxius* infestation should be destroyed within the infestation area by chipping to ≤1.5cm in three dimensions, and/or burning. Firewood, roundwood, sawn wood, wood chips, waste wood and debris found to contain *A. anxius* life-stages, or showing signs of infestation, should be destroyed in the same way. All equipment used in the disposal of *A. anxius*-infested trees should be thoroughly cleaned between sites to remove any wood chips in particular, as per standard biosecurity protocols.

5.69 During the *A. anxius* flight period (April-September), all felled trees within the infested area should be processed and destroyed as soon as possible after they have been inspected, within a maximum of one week. Outside the flight period, between early October and the end of March, trees need not be destroyed immediately, but they must be chipped/burned before the start of the next flying period.

5.70 It is preferable to burn infested material on site, within the infested area, but material chipped to ≤1.5cm could be moved off-site to processors outside the infested area if destined for immediate destruction, e.g., as biomass, and if covered securely during transport or is shipped in sealed containers. Additional restrictions may be imposed on a case-by-case basis, especially during the insect's flight period, such as those that form the *Ips typographus* Authorised Processor requirements.

5.71 For previous plant health outbreaks in England, the FC has put in place framework incineration contracts with prior agreement from the Environment Agency, allowing it to exceed the 10 tonnes per day limit. Such contracts might be required in the event of an *A. anxius* outbreak. Site-by-site burning agreements with the Environment Agency or SEPA would be good practice, whether seeking approval to exceed 10 tonnes per day or not. (Check with the Environment Agency for current details: D7 waste exemption: burning waste in the open - GOV.UK).

5.72 Landowners need to ensure that any clearance complies with Habitat Regulations. If needed, permissions can be sought to undertake emergency activities e.g., felling. Further information may be obtained from Natural England or the FC (the latter being the lead authority for all forestry activity).

Replanting

5.73 The planting of host plants (*Betula* spp.) will be prohibited in the demarcated area during the outbreak.

Public outreach

5.74 It is crucial to have public support for the management programme and to help with general surveillance. Engaging the public will require the provision of timely, balanced and accurate information about monitoring and control. It can also provide opportunities for the public to participate in monitoring and reporting suspect trees using the reporting tool Tree Alert. The voluntary tree health surveillance network Observatree could also be deployed. Further information about communications is provided in section 5.30.

6. Criteria for declaring eradication / change of policy

6.1 The outbreak shall be considered eradicated if *A. anxius* is not detected for a minimum period encompassing two complete life cycles (approximately four years) following the removal of the final infested trees.

Review measures in the cases of prolonged official action

6.2 Where eradication is unsuccessful, i.e. where new infestations continue to be found at greater and greater distances from the initial site of infestation, efforts should shift to slowing the spread of the pest and managing its impact. If continuing action is required within the demarcated area over a prolonged period, a review of the management programme should be undertaken regularly (e.g., annually) to determine the success and cost-effectiveness of the measures in the longer term. This review will involve consultation with stakeholders and should include:

- evaluation of the effectiveness of current measures;
- evaluation of the economic impact and cost effectiveness of continuing existing measures;
- consideration of further measures to eradicate or slow the spread of the pest;
- consideration of statutory obligations and impact on import and export procedures;
- consideration of alternative approaches or the cessation of statutory action; and

- consideration of the impacts on biodiversity from control methods.

Criteria for declaring/change of policy

6.3 When and if policy makers in the country or countries affected deem that eradication is no longer a viable option, there will be a move towards slowing the spread of the pest and reducing its impacts. This should be considered on a case-by-case basis following agreed transition arrangements. Further details can be found in the Generic Contingency Plans for each country.

6.4 In circumstances where official action is no longer considered appropriate, stakeholders should be consulted, and a timetable and mechanism agreed for the removal of official measures and for the dissemination of information on managing the pest as appropriate.

7. Evaluation and review of the contingency plan

7.1 This pest specific contingency plan should be reviewed regularly to take into account changes in legislation, control procedures, pesticide regulations, sampling and diagnosis methods, and any other relevant amendments.

7.2 Lessons learned should be identified during and after any outbreaks of *A. anxius* or other pest, including what went well and what did not. These should be included in any review of the contingency plan, leading to continuous improvement of the plan and response to outbreaks.

8. Appendices

Appendix 1: Factsheet for *Agrilus anxius*

8.1 Identity of organism and quarantine status

- Species name: *Agrilus anxius* (Gory, 1841)
- (Coleoptera: Buprestidae)
- Synonyms: *Agrilus gravis* LeConte, *Agrilus torpidus* LeConte
- Common name: Bronze birch borer
- UK risk rating: Unmitigated 100/125; mitigated 50/125
- EU status: *Agrilus anxius* is on the EPPO A1 list.
- UK status: Absent

8.2 Hosts

- All birch trees (*Betula* spp.)

8.3 Life cycle

- The life cycle of *A. anxius* can last 1 or 2 years (Figure 2). The insect overwinters as larvae in the wood, just under the bark. Pupation takes place in shallow cells in the xylem in late April and early May (Hoover 2002). Various emergence periods are reported in the literature, varying widely across the North American continent. Broadly, adults emerge from May to mid-July, depending on climatic conditions, though emergence may begin earlier or later in the year in the southern and northern extremes of its distribution, respectively (Muilenberg & Herms, 2012). The UK Climate-Pest Risk Web tool predicts that emergence in Great Britain would likely occur from mid-June in the south, extending to late July in the north of England and Scotland, and areas of higher altitude (Met Office 2025).

- The pest has a 1- or 2-year life cycle. In vigorous (i.e., non-stressed) hosts and in colder climates, the pest has a 2-year life cycle. Dates of emergence and the end of larval feeding etc. depend on the climate and other conditions. This varies widely across the North American range of this beetle, in association with the distribution of *Betula*. It is unclear whether this would be the case if *A. anxius* established in the UK.

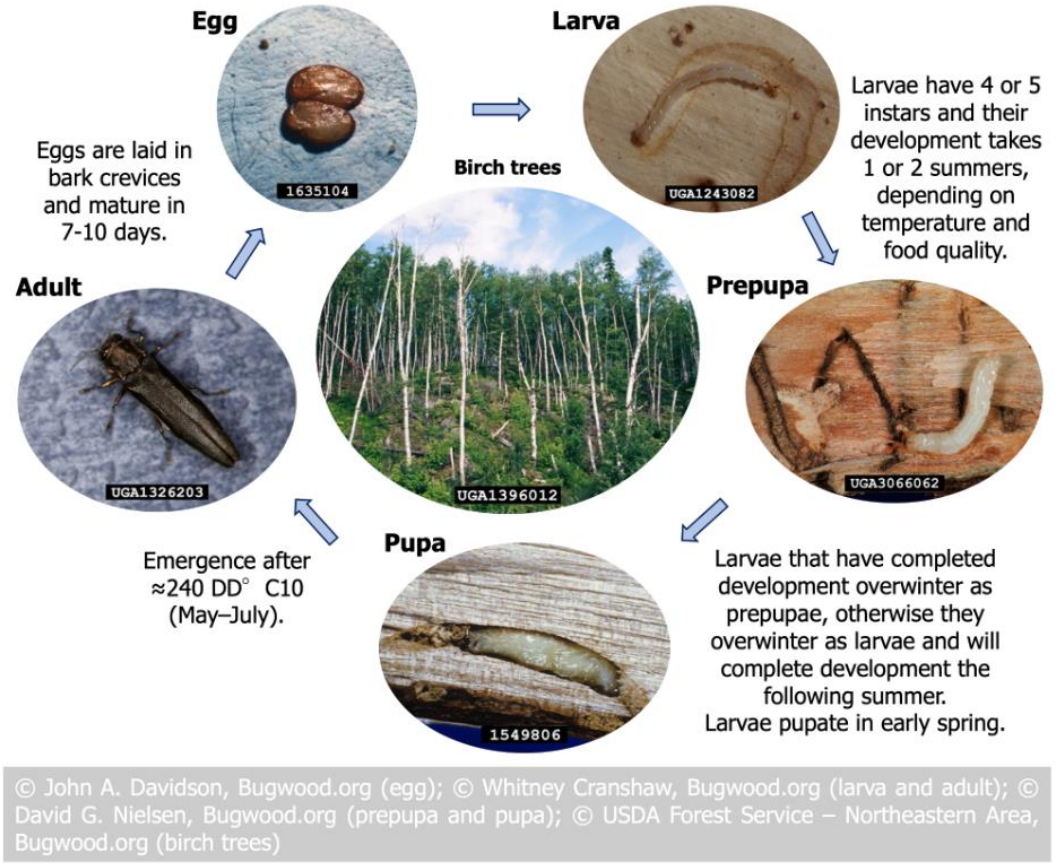

Figure 1: *A.anxius* life cycle (EFSA, 2020)

8.4 Life stages

- *A. anxius* has four larval stages, or instars. Eggs are laid in cracks and crevices on the bark of stems or branches. Larvae bore into the bark after hatching, and feed by making galleries in the phloem and scarring the outer xylem. (Note: in the USA, larvae have not been reported to colonise trees with main stems below 2cm diameter, but have been observed to bore from larger stems and branches into branches as small as 1cm diameter (Herms, pers. obs.; Nielsen, pers. obs.). Most 4th-instar larvae bore into the outer sapwood to construct individual pupal chambers (generally to a depth of 1cm, and rarely deeper than 2.5- cm, based on data obtained for *A. planipennis*). Each 4th-instar larva also bores a short gallery into the outer bark which the future adult will use to exit the tree. The larva fills this gallery in the outer bark with frass. The 4th-instar larva overwinters inside the pupal chamber, and is often referred to as a prepupa at this time.

- Due to their habit of living mostly within the wood, late larval stages, i.e. 4th-instar larvae, pre-pupae, and pupae are likely to survive in wood even if the bark is removed. Development starts again after the pre-pupae have experienced a suitable cold period, and pupae form in the pupal chamber. Pupation ends and adults emerge once enough days of adequate temperatures have accumulated - 240 degree-days with the threshold of 10°C (DD°C10) (Akers and Nielsen, 1984). Adult emergence generally occurs over 10 to 12 weeks during late spring and early

summer. Adults have a life span of approximately 23 days, and require continuous feeding on foliage, including seven to 10 days of maturation feeding before becoming reproductively mature. They have a short survival period of four to seven days in the absence of food.

8.5 Identification

- The eggs of *A. anxius* (Fig. 2) are white to creamy, becoming more yellow as they mature (Barter, 1957). Eggs are oval and approximately 1.5mm long by 0.75mm wide (Hutchings, 1923; Barter, 1957). Females lay eggs (singly or in clusters) in bark crevices and can lay up to 75 eggs during a lifetime.

Figure 3: *A. anxius* eggs, in oviposition just before hatching into larvae. Source G. Barter, Canadian Forestry Department

- Larvae are white to creamy, with flat top and bottom surfaces (Fig. 3). The head is small, and protracted into the wide prothorax. There are eight abdominal segments, followed by two caudal segments (Barter, 1957). The final caudal segment terminates in two sclerotized, tooth-like styles (urogomphi), which are characteristic of *Agrilus* (Slingerland, 1906). Mature larvae are 8–20mm long, and have four instars (Loerch & Cameron, 1983b). They start boring into the wood immediately after hatching.

- Adults are small, narrow, metallic copper-coloured beetles 7-12mm long (Muilenberg & Herms, 2012).

Figure 3*: A. anxius* larval stage. Source: W. Cranshaw, Colorado State University.

Figure 4: Adult *A. anxius*. Source: W. Cranshaw, Colorado State University.

8.6 Distribution

- The bronze birch borer is endemic to North America, with its ancestral distribution mirroring that of its native evolutionary birch hosts across the boreal and northern hardwood forests in northern and eastern swathes of the continent (Muilenburg & Herms 2012). However, as planting of birch has increased in North America, particularly the use of exotic birch species as amenity trees which are highly susceptible to the pest, the bronze birch borer's range has expanded using these newly available host species. Therefore, the range of the bronze birch borer is larger than it originally was, now covering most of the continent moving south and westwards - only a few of the most southerly states in the USA and northerly states in Canada are free of the pest (Fig. 5). *A. anxius* has yet to be introduced outside North America.

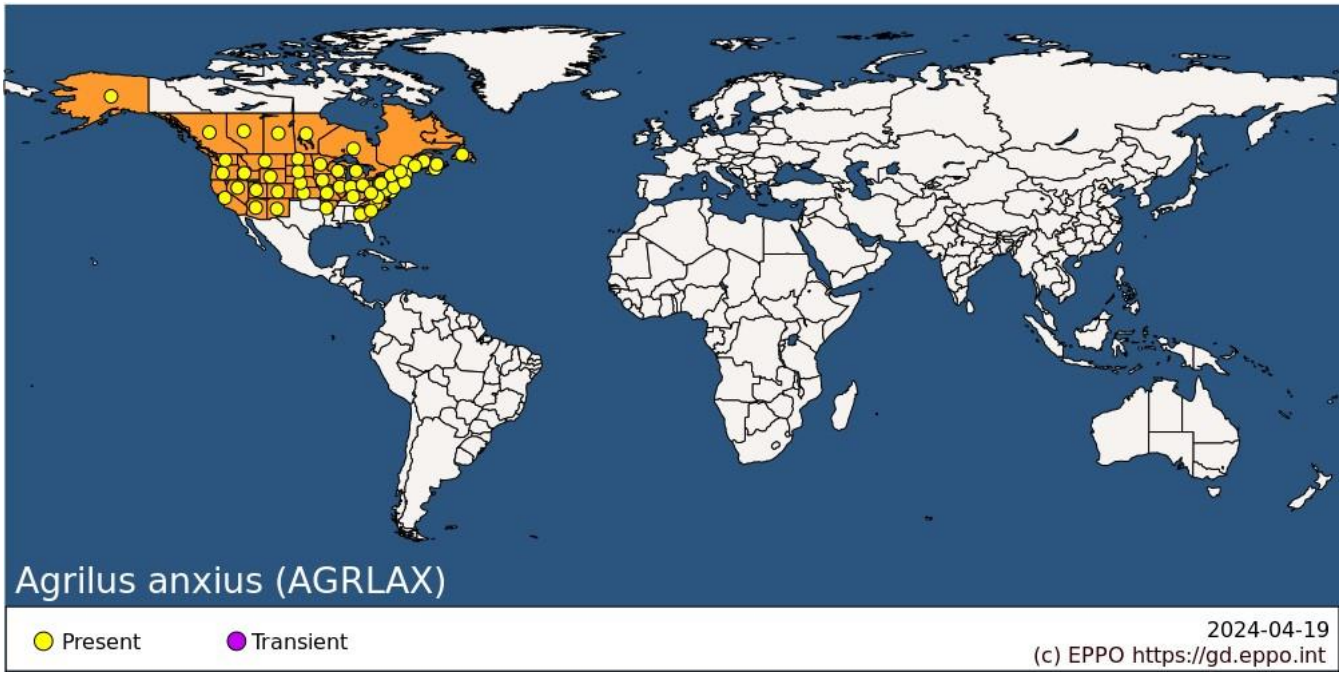

Figure 5: Global distribution of the bronze birch borer (*Agrilus anxius*) as of April 2024 (EPPO 2024) Agrilus anxius (AGRLAX)[World distribution]| EPPO Global Database.

- North America: Canada (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Québec, Saskatchewan), United States of America (Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming) (EPPO, 2024).

8.8 Damage impact and controls

- Damage is caused by the larvae feeding on the inner bark and cambium of the tree. Repeated attacks and the construction of numerous winding galleries by the larvae cause disruption to nutrient transport, which eventually kills the roots of the host plant. Larval galleries can also girdle branches and trunks. Initial symptoms of an infestation appear in the upper crown of the tree, with leaf yellowing and branch dieback (Fig. 6).

8.9 Natural Predators

- There are several natural enemies of *A. anxius* described in the literature from its native range in North America, including the larval parasitic wasp *Tetrastichus* sp., and the encyrtid egg parasitoids *Ooencyrtus* sp. and *Avetianella* sp. (Loerch & Cameron, 1983a). However, it is not known how effective these species would be as biocontrol agents in the UK, or whether these species would attack our native *Agrilus* species.

Figure 6: Leaf yellowing and branch dieback associated with *A. anxius*. Source: S. Katovich, USDA Forest Service.

- Other evidence of an infestation is the presence of 3-5mm-wide, 'D'-shaped exit holes formed by the emerging adult beetles (Fig. 7).

Figure 7: D-shaped exit holes of *A. anxius*. Source: W. Cranshaw, Colorado State University

- Rust-coloured sap oozing and staining can be observed on the outer bark, along with swellings and bumps where the tree has healed inside (Fig. 8).

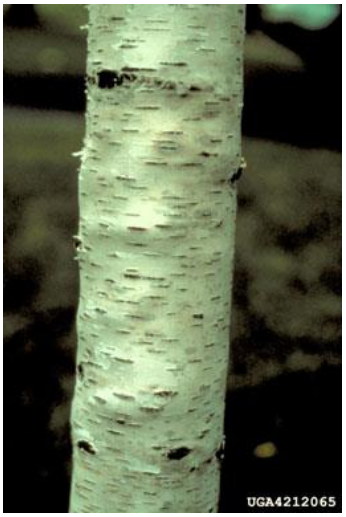

Figure 8: Swellings visible under the bark of a tree infested with *A. anxius*. Source: Minnesota Department of Natural Resources

- In many cases, tree mortality is observed within a few years after the appearance of the first symptoms. Birches that are weakened or stressed by drought, old age, insect defoliation, soil compaction, stem or root injury are more susceptible to damage by *A. anxius*. Adult beetles feed on leaves (*Alnus, Betula, Populus*), but damage to the foliage is insignificant.

8.10 **Main pathways**

- Plants for planting and wood of *Betula* spp. with or without bark.

8.11 **Import controls**

- Import restrictions are in place on wood of birch into the U.K: Import timber, wood products or bark – Gov.uk. Birch wood coming from the USA or Canada, where *A. anxius* is present, must be de-barked and have at least 2.5cm of sapwood removed, or be treated with ionizing irradiation to achieve a minimum absorbed dose of 1 KGy throughout the wood. Wood chips, wood waste, scrap wood or similar material obtained in whole or in part from birch must be accompanied by an official statement confirming that it has originated from a country free of *A. anxius*, i.e. these materials, if they contain birch, cannot be imported from the USA or Canada. Isolated bark of birch must be free of wood. Birch (*Betula* spp.) plants for planting must originate from a country known to be free of *A. anxius.*

8.12 **Chemical insecticide treatments**

- Chemical insecticides can be effective in killing larvae, pupae and adults of *A. anxius*, but they are not recommended for control. The possible use of any chemical insecticide treatments will be considered by the IMT for trees in the infested zone. Insecticides are costly, and are likely to have undesirable side effects, especially if applied on a large scale. For practical and environmental reasons, therefore, it is

proposed that chemical control is used only in exceptional cases, i.e. for the protection of historic and valuable amenity trees and trees of historical, heritage or cultural importance.

- Defra will consider options for emergency authorisations of trunk injection insecticide products containing emamectin benzoate that are registered in the EU but not GB. In addition, extensions of authorisation for minor use (EAMU) may be considered for scenarios not covered by existing 'on label' approvals in GB. Comprehensive guidance on types of insecticides used in the USA to control the closely related EAB, and on timing of insecticide application at different stages of the lifecycle, are given in "Insecticide options for protecting ash trees from emerald ash borer" (Herms et al., 2019). In Canada, the preferred insecticide for controlling EAB is "TreeAzin", which is based on azadirachtin, a natural insecticide derived from the neem tree – neem oil is listed as a chemical management option for *A. anxius* in the US (see Agrilus anxius | Insect & Mite Guide | Center for Agriculture, Food, and the Environment at UMass Amherst). This, and other insecticide products may be of use in the future should any of them become registered for use in the UK.

Appendix 2: Factors to consider when developing a management strategy and operational procedures

Table 1: management strategy and operational procedures

Qualifying Factor	Influence/effect	Management response/ implications
Number of infested trees	A small number of infested trees close together can be dealt with more quickly and there is less chance that the beetles will have spread. A greater number of infested trees scattered across a large area is more likely to be associated with *A. anxius* having been present for >2 generations and having spread to a much wider area.	A small, concentrated population is more likely to be eradicated than a larger, more dispersed population.
Abundance & distribution of birch	Small numbers of birch trees in the vicinity will be easier to survey and remove, but may have resulted in *A. anxius* dispersing greater distances to locate hosts. Large numbers of birch trees and blocks of birch woodland close to the outbreak site will be more difficult to survey and infested trees may be missed, but *A. anxius* may not have needed to disperse as widely.	Surveys will need to cover a wider area, but it should be possible to inspect & remove trees more quickly and to fell outward to distances >1 km. Eradication more likely to be successful if detection is early. Greater input to survey work required and more intensive monitoring. Larger numbers of trees will need to be felled within 400m, which will increase costs and require more time. Less chance of successful eradication.
Time of year/flight period	Flight period: Conservatively, April to September	Infested trees and all other birch within 400m will need to be felled and destroyed immediately to reduce emergence and dispersal. Survey work will also need to be completed as quickly as possible to delimit the outbreak and this, and tree felling, will place acute demands on resources.

	Outside flight period: October through to the beginning of April the following year.	Trees do not need to be cut & destroyed immediately, giving more time for surveys, investigations, and delimiting the outbreak, but all infested trees must be removed & destroyed before the start of the next flight period (i.e. before April).
Land use/ownership	Rural areas characterised by fewer, larger landholdings, and birch present in a wide range of habitats and situations, e.g., as individual trees, in hedgerows and in woodlands. Urban areas characterised by large numbers of small, private ownerships. Birch present in gardens, as street trees, in parks and other public open spaces. Nature conservation sites/SSSIs	Birch in rural areas generally easier to access and remove, but there are likely to be many more birch trees. Therefore, operations may be more challenging than liaison. More resources required to liaise with landowners in urban areas and it will be more difficult to remove birch trees from gardens, but there are likely to be fewer birch trees. Therefore, liaison may be more challenging than operations. May require special considerations in relation to retention of birch.
Site conditions	Stressed birch on poor, dry sites are likely to be particularly susceptible to *A. anxius*, compared with healthy birch growing on good sites. However, although birch on good sites may be less susceptible, it may harbour cryptic infestations for longer before detection.	Surveys to detect *A. anxius* should pay particular attention to birch on poor sites, where the pest may establish more readily and its populations increase more rapidly. Detecting low density *A. anxius* infestations amongst healthy birch trees may be particularly difficult and time consuming.
Climate	Warm climate, e.g., south and SE England: most *A. anxius* complete life-cycle in 1-year in the US, favouring rapid population increase, and this	Rapid population increase and spread means that eradication is less likely to be achieved, and it may be more difficult to slow the spread of the pest.

	may be the case in the warmest areas of England. There remain uncertainties however about the influence of the cooler summers typical in the UK. Warmer conditions increase dispersal during the flight period. Cool climate, e.g., north England & Scotland: *A. anxius* more likely to have a 2-year life-cycle; populations increase more slowly, and dispersal is less rapid and occurs over shorter distances.	Surveys will have to be carried out over larger areas to account for the greater capacity for dispersal. Infestation will develop more rapidly and trees will succumb more quickly, increasing the pressure to remove trees before they release beetles or become a H&S risk. Slower rates of population increase and dispersal make it more likely that the pest can be eradicated or prevented from spreading.

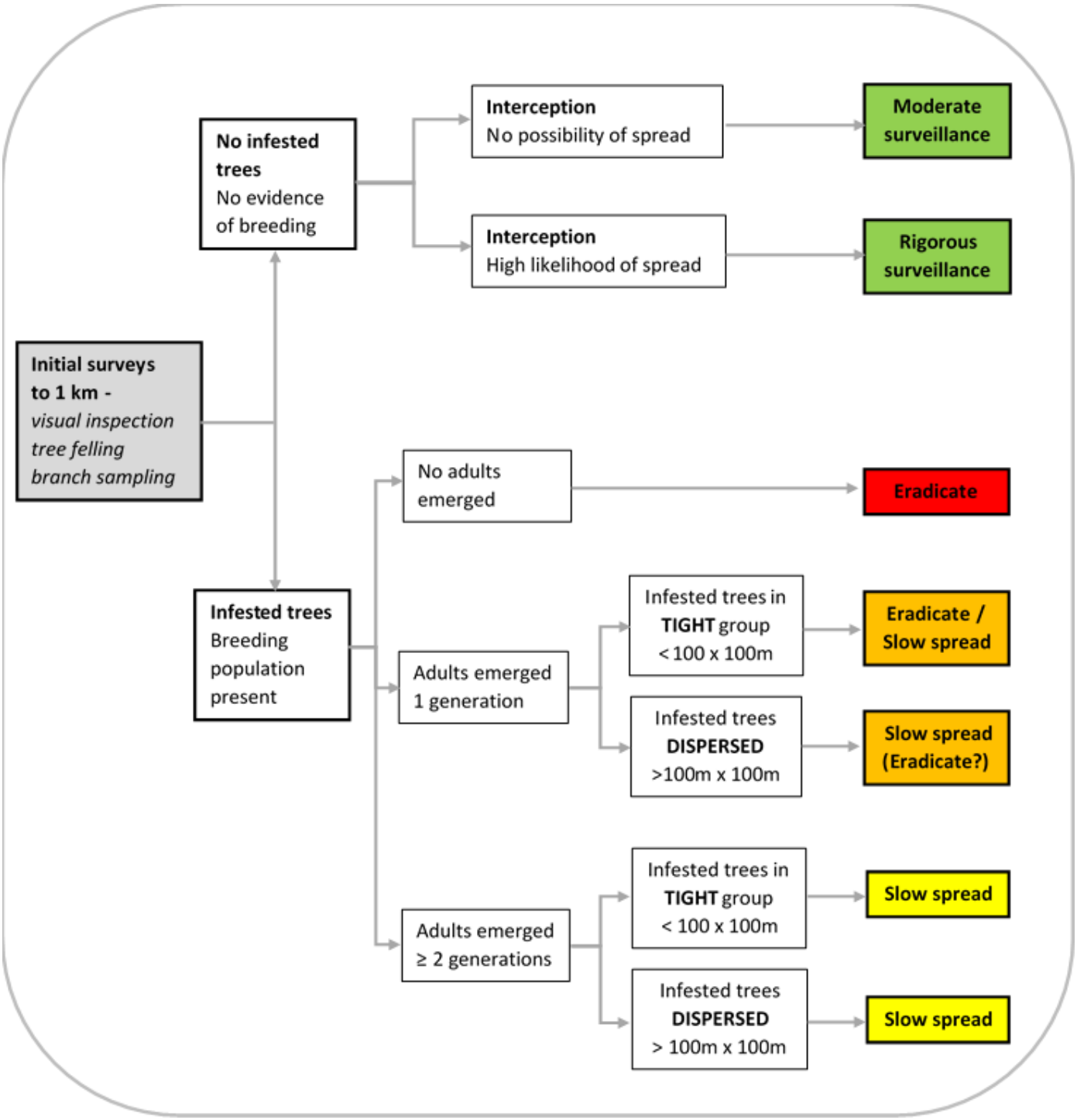

Figure 9. Guidance for what managements strategies for *Agrilus anxius* could look like

Appendix 3: Relevant legislation

8.13 Domestic legislation

- Regulation (EU) 2016/2031 of the European Parliament of the Council (as assimilated in Great Britain)
- Commission Implementing Regulation (EU) 2019/2072 (as assimilated in Great Britain)
- The Environmental Authorisations (Scotland) Regulations 2018
- The Environmental Permitting (England and Wales) Regulations 2010
- Natural Environment and Rural Communities Act 2006
- The Official Controls (Plant Health and Genetically Modified Organisms) (England) Regulations 2019
- The Official Controls (Plant Health and Genetically Modified Organisms) (Wales) Regulations 2020
- The Plant Health (Official Controls and Miscellaneous Provisions) (Scotland) Regulations 2019
- Plant Health Act 1967
- Forestry Act 1967

8.12 European legislation

- New EU Plant Health regulations (Smarter Rules for Safer Food):
- Regulation (EU) 2016/2031 of the European Parliament
- European Commission Implementing Regulation (EU) 2019/2072
- European Commission Delegated Regulation (EU) 2019/1702
- The new EU Plant Health regulations repeal and replace the previous Plant Health directive (EC Directive 2000/29/EC).

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