Operations Note 046 Date: 20 September 2018

Managing ash (*Fraxinus excelsior*) in woodlands in light of ash dieback (*Hymenoscyphus fraxineus*)

Purpose

This document provides practical advice to anybody with a responsibility for the **management of ash in woodlands** and will also act as a reference to help guide consistent decisions by government officials who administer forestry regulations concerning trees and woodlands.

Context

The advice is based on the expert knowledge of UK researchers and practitioners, and is informed by evidence and experience from Europe where the disease has been established for over 25 years. This guidance is also in line with the government approach to ash dieback as set out in the Tree Health Resilience Strategy published in May 2018.

Separate advice will shortly be produced on management of non-woodland ash, particularly those adjacent to roads and rights-of-way, providing a suite of guidance for managers and regulators of trees.

Background

The appearance of the *Hymenoscyphus fraxineus* fungus in Britain has meant that the future of common ash (*Fraxinus excelsior*) as a woodland tree species is under serious threat. The disease is present in all counties of England, and experience in mainland Europe suggests that the majority of ash trees in woodlands infected with the disease will decline and die over the next 10–15 years.

There is growing evidence that once trees are infected by *H. fraxineus,* and the disease has progressed to the point where basal lesions are exhibited, the trees become susceptible to colonisation by secondary pathogens such as *Armillaria spp.* (honey fungus). These secondary pathogens can result in butt or root rot, destabilisation of the tree making them prone to falling, and may ultimately be the final cause tree decline and death.

The concentration of effort should now be on managing woodland with the disease. Therefore we strongly recommend that all owners of woodland containing ash prepare or amend management plans to describe how this species will be managed, including giving due consideration to which alternative tree species might be used for restocking where required.

Currently there is no known efficient prevention or curative treatment (e.g. silvicultural or chemical approach) that will alleviate or mitigate the effects of ash dieback. However several studies have reported that a low proportion of trees (1-5% of the population) may possess a partial but heritable tolerance to *H. fraxineus.* Therefore, forestry practices can play a key role in conservation strategies by retaining trees with exceptionally low damage levels from which tolerant regeneration may result. In severely damaged stands the retention of these tolerant ash trees may, however, not be beneficial for future stand development due to numbers being too low for successful regeneration, or justified from an economic perspective. Nevertheless, it is still recommended that the best trees are retained (i.e. those with minimal crown damage and no root collar lesions) to facilitate possible long-term adaptation of ash populations to *H. fraxineus* through potentially tolerant genotypes.

Practical Advice

The choice of action will depend very much on owners' and managers' objectives, and the regulatory framework for woodland management. The advice given is therefore neither exhaustive nor prescriptive. This document will continue to be revised as our knowledge and understanding of the disease develops. Currently the felling of diseased ash within woodlands still requires a felling licence from the Forestry Commission unless they are dead or pose a real danger. To find out more see our Tree felling –overview guidance on GOV.UK.

Principles

The objective of this guidance is to reduce the impact of ash dieback to help achieve the following underlying principles:

- maintaining as far as possible the values and benefits associated with ash woodlands
- securing an economic return where timber production is an important objective
- maintaining as much genetic diversity in ash trees as possible with the aim of ensuring the presence of ash in the long term
- minimising impacts on associated species and wider biodiversity
- managing the health and safety risks from dead and dying trees

Management objectives

As there is no cure for *H. fraxineus*, and no clear method for stopping its spread the aim of management should be to lessen the impact of the disease.

Before making any changes to existing management regimes, owners and managers should carefully consider their objectives and local circumstances. Any woodland or individual tree can bring a variety of benefits, and be managed for those multiple benefits. The potential objectives and management below are purely to assist the owner or the manager when thinking about what to do next – in practice a hybrid approach might be appropriate.

Managing the health and safety risk from dead and dying trees

Public safety is likely to be one the biggest management issues for owners of ash in woodlands as the disease weakens or kills trees over the coming years, particularly as infected trees are likely to have considerable amounts of dead wood in the crown. Trees infected at the base by *H. fraxineus,* and associated secondary pathogens, may rapidly lose their structural integrity and anchorage in the soil because of butt and root rot. For example, ash colonised by *Armillaria spp.* begin to pose risks to forest workers and visitors within two years of basal necrosis formation, and after five years, about half of affected trees are likely to have sufficient decay to be assumed hazardous.

Trees in areas with high levels of public access or other recreational use need to be monitored carefully for risks to safety, and some felling or pruning of dead or dying trees is advisable if risk assessments show they are a hazard.

Special care may be needed during felling operations as infected trees may react unpredictably; this will be of particular concern where manual felling is undertaken. It is, therefore, essential to plan felling operations to remove the risk of accident or injury to chainsaw operators working with infected ash trees. The primary consideration must be whether the job can be done by other means. The best control measure is to use mechanical harvesting equipment where the operator is in a protective cab, but care must be taken not to damage woodland soils through inappropriate machinery or its incorrect use. Where this is not possible, it is more important than ever that a chainsaw operator is both competent and properly equipped. The Forestry Industry Safety Accord (FISA) has produced ash-specific guidance for forest managers.

Further information about tree safety in general is available in the publication Common sense risk management of trees.

Where timber production is a primary objective

Options for *H. fraxineus* infected crops

a) Younger stands (i.e. up to pole stage or less than 25 years of age)

Younger trees are the most vulnerable to the disease, and are usually rapidly killed once infected. If few trees appear infected, selective thinning of symptomatic and suppressed trees is recommended.

If the majority of the ash in the stand is infected, the annual rate of spore production is likely to be very high. Here, the economic value and condition of the trees will decline rapidly, and therefore the decision may be taken to realise that value immediately. However, some ash trees should be retained which:

1. might prove to have some disease tolerance (i.e. have minimal/no crown damage and no root collar lesions)
2. will provide deadwood/biodiversity benefits (i.e. are close to dying)

Options to consider include:

- felling the ash to allow restocking or regeneration from either healthy ash or other species in the stand

- if there are enough trees of other species to form a closed stand within 10 years, it is likely that management objectives can still be achieved without replanting after felling the ash
- if there are **not** enough trees of other species to form a closed stand within 10 years, it is likely that the stand will have to be regenerated after felling by planting or regenerating alternative species, assuming there is sufficient space and light to do so (see section on planting alternative species for guidance).

b) Older stands (greater than 25 years of age)

Where possible, an individual-tree approach is recommended for older stands with infected trees.

Where more than 50% of the crown is infected and survival of the tree depends on epicormic shoots, felling should be considered because the tree's economic value is declining as they have become seriously infected.

Where less than 50% of the crown is infected, trees should be regularly monitored to ensure appropriate management. However, managers should also assess the risk of *Armillaria* attack, primarily by checking for basal lesions caused by *H. fraxineus*. If timber production is an important objective, felling should be considered if *Armillaria* is present on the site as this can cause root and butt rot of the trees.

In all cases any apparently tolerant trees should be retained, as should a proportion of dying or dead trees where it is safe to do so.

If there are no apparently tolerant mature ash trees left on a mixed-species site, and regeneration has failed, and if there are enough trees of other species to form a closed stand within 10 years, it is likely that management objectives can still be achieved without carrying out further regeneration.

In other cases the stand should be restocked by either natural regeneration or planting alternative species, until tolerant strains of ash become available.

Reducing the impact of future *H. fraxineus* infection

There is no way to remove the risk of infection by *H. fraxineus*, however, the best way to reduce future disease impact is to promote fast, healthy growth of selected trees and ensure high standards of silviculture. Guidance on this can be found in 'Managing Native Broadleaved Woodland' available for £30 from The Stationery Office or in FC Handbook 9 - 'Growing Broadleaves for Timber'. This will not prevent the onset of the disease if spores are present, but will maximise the timber value at the time of felling.

This should be carried out in combination with:

- adhering to biosecurity measures to reduce the spread of disease
- regular monitoring for signs of *H. fraxineus* infection, both in mature stands and on recent natural regeneration

Conserving environmental benefits

Although lower levels of intervention may be appropriate, where conserving environmental benefits is the key objective, active intervention by felling diseased trees can also increase species and structural diversity. Retention of larger quantities of dying and dead trees will be beneficial; it may also be appropriate to plan to retain ash as a

component for as long as possible to provide habitat for those species dependant on ash trees, and allow time for tolerant trees to be identified. In general, ash woodlands of high environmental benefit also include a mixture of other tree species which will secure many of the same environmental benefits, albeit with a loss of diversity if ash cannot be retained. Specifically, ash-dominated ravine woods could potentially decline in environmental benefits if appropriate interventions are not made. Specific advice for woodland SSSIs affected by *H. fraxineus* is available at SSSI guidance.

Taking no action will:

- ultimately reduce the proportion of ash in the woodland
- increase the amount of deadwood (standing and on the ground)
- potentially allow tolerant trees to be identified

Active management could:

- open up the woodland to allow earlier natural regeneration
- encourage structural diversity
- let more light into the stand in a controlled fashion to help prevent the establishment of non-woodland flora
- potentially allow tolerant trees to be identified

Even where conservation is a key objective the potential risk to people from dead and dying trees must always be assessed and appropriate action taken.

Conserving priority or protected species

If there are rare, threatened or protected species with a particular requirement for ash to be present, specific advice might be needed for that site to maintain them. Current advice recommends a presumption against felling mature ash trees with which some European Protected Species are associated. However, impact on protected species should be considered in all forest operations, you can find our more in our guide – manage and protect woodland wildlife.

Encouraging regeneration

Planting ash is currently not possible because we still have import and movement controls on all ash (*Fraxinus*) species as there is a general consensus from experts that introduction of new strains of the pathogen from outside of Europe poses an unacceptable risk to European *Fraxinus* species and should be avoided.

Natural regeneration is the preferred method of replacing ash stands. Tolerance to ash dieback is heritable, so regeneration from tolerant trees is the favoured option where sexually mature trees (more than 30 or 40 years old) are present. As stated above, the percentage of potentially tolerant trees is likely to be very low but with careful management these could regenerate and the species could continue to exist at low levels in mixed stands. Encouraging multiple opportunities for regeneration (through a larger number of smaller interventions for example) will increase genetic “churn” and may result in more chances of tolerant trees emerging.

As well as encouraging ash regeneration, consideration should also be given to other species already present in the stand if they will meet management objectives. Guidance

on the successful use of natural regeneration can be found in FC Bulletin 78 - 'Natural Regeneration of Broadleaves' or in FC Handbook 9 - 'Growing Broadleaves for Timber'.

Regeneration from coppice

Regenerating a stand using coppice shoots from infected felled trees is not recommended as recent observations in East Anglia have shown that over 80% of coppiced ash dies within four years. Coppice is particularly susceptible because the stems are of small diameter and are quickly girdled. *H. fraxineus* infects the roots so coppice regrowth from the infected trees is also likely to be infected.

In ancient woodlands or woodlands where coppice is an important cultural factor, re-coppicing ash should not take place even where the majority of the canopy still appears to be healthy. If the temporary open space created by coppicing is of primary importance for conservation, it should be expected that the majority of coppiced ash will die quickly and plans should be made accordingly.

Planting alternative species

The choice of species to be used for restocking in place of ash must always be guided by management objectives, site conditions, current stand composition and designation status of the site. On brown earth soils, the range of alternative broadleaved species is wide and includes aspen, beech, birch, cherry, field maple, hornbeam, lime, oak, rowan, sweet chestnut and sycamore. On other sites the choice is much more restricted. For example, on ground-water gleys, alder, aspen, oak and willow are possible alternatives and on rendzinas, beech, birch, field maple, hawthorn, holly, wayfaring tree and whitebeam could be considered.

Non-native broadleaved or coniferous species should also be considered for sites with few constraints using our guidance on tree species and provenance.

Ecological Site Classification (ESC) can be used to investigate the suitability of species to a site, and will help managers consider the options with regard to longer-term climate change. See our online Decision Support Service.

If the site is designated for conservation purposes (for example, as a SSSI, SAC or SPA), or is an ancient woodland, SSSI guidance should be followed or advice sought from conservation agency advisers.

Advice on species choice in native broadleaved woodland can be found in the Forestry Commission Handbook 'Managing Native Broadleaved Woodland'. In such woodland the most appropriate response is likely to be the use of a mixture of species.

There is no single species that can be a replacement for ash, either with regard to site requirements or ecological attributes. Detailed guidance on the most appropriate tree and shrub species to mitigate the impact of ash dieback from an ecological perspective can be found in Forestry Commission Research Note 29 'Ecological impacts of ash dieback and mitigation methods' - of particular importance are oak, beech, sycamore and birch.

It is important to note that some alternative species, such as beech, sycamore and Norway maple, are very susceptible to bark stripping by grey squirrels.

Re-using tree shelters from diseased sites

Remove any leaf material from any tree shelters if they are to be used elsewhere to prevent any spread of *H. fraxineus* between sites.

Mammal management

High deer populations in particular, together with other mammals such as rabbits, hares and voles can prevent the establishment of new tree crops. They should therefore always be managed where establishment by planting or natural regeneration is an aim. If management is not possible other means of protection should be used.

Moving logs and firewood

Ash wood may continue to be moved from uninfected and infected sites within Great Britain. However, simply brushing leaf and shoot material from logs, firewood and vehicles before they leave the site will help prevent unintentional spread with logs and firewood.

See our current guidance, Effects of legislation on the timber and firewood trades.

Breeding *H. fraxineus*-tolerant ash

Although no individual trees have been found to be totally resistant to *H. fraxineus*, research in Europe and the UK suggests that some ash trees may demonstrate tolerance to this pathogen. In each ash population, a few trees consistently show low levels of infection, and these could be used to create a *H. fraxineus*-tolerant breeding population for restocking infected areas in the future.

This tolerance is heritable (i.e. it can be passed on between generations), and appears to be due to a suite of genes rather than a single gene. This is important, because disease tolerance is less likely to break down due to genetic change in *H. fraxineus* if the observed tolerance results from multi-gene combinations rather than simple single-gene differences. It should therefore be possible to breed some degree of tolerance into ash populations, but it will take some years before this will provide planting stock for the market.

Woodland owners in particular can help by:

- not felling any mature ash trees unless necessary for public safety or timber production reasons
- retaining some apparently tolerant mature trees
- monitoring ash trees' health over the coming years, and noting any which appear to be minimally affected by the disease
- protecting tolerant ash regeneration

Chemical control methods

There are currently no fungicides or other chemicals approved for use in UK forests for controlling *H. fraxineus*.

Increasing resilience of woodlands

One strategy to improve the resilience of woodland to both disease and climate change is to increase the species, genetic and age diversity of woodlands. Developing stands of mixed species and age may make woodland less vulnerable to disease, and adopting a continuous-cover approach, where practicable and appropriate, could be one way to achieve this.

Versions

Version 1.0 – issued 20 September 2018

Annex 1 - Ash dieback management decision tool