Chalara fraxinea and other threats to woodland

Report of a Woodland Trust Conference

WOODLAND TRUST

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This paper reflects discussions at an 'Expert Seminar' hosted by the Woodland Trust and Defra and held in Church House, London on the 27 June 2013 (Further details of the programme of discussion and copies of presentations can be found on the Woodland Trust website – woodlandtrust.org.uk).

The seminar brought together 40 scientists, researchers, forest pathologists, woodland managers, professional bodies, government agencies and nature conservation NGOs to share experience and learning as well as identify key gaps in knowledge and practice.

The aim was to explore the nature of the threats to our trees and woods highlighted by recent concerns about *C. fraxinea*, and to identify areas of broad consensus, as well as the key areas of uncertainty or lack of knowledge.

The problem

There has been an increasing threat to both native and introduced trees in the UK from the arrival of new pests and diseases. Some are now well established, including *Phytophthora ramorum*, *Dothistroma* needle blight and of course *C. fraxinea*; others have been found but not yet taken hold, such as chestnut blight (*Cryphonectria parasitica*) and Asian Longhorn Beetle; some are not well understood such as Acute Oak Decline (AOD), and many more which could be potentially devastating are getting closer to our borders, like the Emerald Ash Borer.

In most cases new pests and diseases establish and are present for several years before they are detected. Even where organisms can be detected in their country of origin it is not easy to predict how they might behave in the UK. What appears to be a relatively benign organism in one location can become highly infectious elsewhere e.g. *C. fraxinea*. In some cases organisms can jump hosts and become a virulent pathogen on another species e.g. *Phytophthora ramorum*. In addition, climate change may allow organisms already present to switch from benign to invasive states, due to changes in their behaviour or a shift in vulnerability of their hosts.

The potential impact of *C. fraxinea* has grabbed the attention of the public, the media, and politicians. However, there is a risk that this will distract attention and divert resources from potentially more serious pest and diseases, or other threats. For instance, economically *Phytophthora* on larch is almost certainly more significant, and the threat from the Emerald Ash Borer, were it to arrive, potentially greater than that from *C. fraxinea*.

Recent worries over pests and diseases have also temporarily over-shadowed concerns about the impact of changing climate on trees and woodland. Some of these may interact directly with those for pests and diseases, for instance where the likely overwinter survival or spread of a pathogen is aided by a warming climate.

The global trade in plant materials seems likely to be a major factor in the increased spread of pests and diseases, but for some natural spread has also occurred both to and within the UK. Understanding the pathways by which pests and diseases spread, whether naturally or with human help, is critical to developing response strategies. There is currently insufficient knowledge of such pathways and their importance.

While there is general agreement that biosecurity measures relating to plants and plant material are insufficient, the importance and value of international trade are of major national economic significance. Within the EU trading block, barriers to cross border trade are very few and even, at a global level, trade agreements make the control of trade for the purposes of biosecurity problematic. The value of international trade to the UK economy may at present outweigh the perceived economic cost of biosecurity risks to trees and forests.

We need to learn from the *C. fraxinea* and other outbreaks to develop ways of limiting future impacts, by stopping or reducing the rate of new pests and diseases arriving. The most cost effective way of doing this may be through ensuring that responsibility for guaranteeing the

disease free status of imports is pushed back to the suppliers at source. Strengthening systems to improve interception at borders is more expensive and more difficult. However, the 'clean-up' costs involved in control and management once an organism is present in the UK wider environment and inflicting significant and widespread damage make this the most costly option of all.

A specific example of the interactions between trade, economics and biosecurity risk is the current practice of spot purchase of planting stock. A lack of spare capacity and uncertainty over forward planning in UK nurseries means that many forest transplants are sourced from outside the UK. Supplying UK grown nursery stock has the potential to reduce the risk of introducing pathogens. However, this requires both forward planning and potentially some form of advance purchase or contract growing to allow the nursery industry sufficient guarantee of the sale of material.

Whilst there is a need to respond to the immediate issues raised by current pests and diseases, there are also longer term considerations if our trees and woods are to continue to supply the ecosystem goods and services that we value. *C. fraxinea* should thus be seen as an example of a series of wider issues impacting on forest health, which will require a longer term and more strategic response. These include in particular, potential threats from other diseases and pests, impacts of climate change on forest and productivity, increasing pressure from browsing/grazing animals, and the impacts from eutrophication, wider nutrient contamination and other forms of pollution.

Monitoring impacts

C. fraxinea is now established in woods in the wider environment beyond recently planted trees. While young stems tend to die rapidly, infected older trees survive longer, often showing signs of crown dieback and flushes of epicormic growth. It is unclear whether all infected older trees will eventually die. A key knowledge gap is how the disease will progress under UK conditions, how long infected trees will survive and what the response of the rest of the ecosystem might be.

There has been an initial assessment of the key groups of species likely to be impacted by declines in ash populations. Decline in ash, where it is currently abundant, and would subsequently be replaced by other tree species would lead to significant changes because of the distinct nature of ash – light canopy, rapid litter breakdown and so on. No other single tree species is close in terms of major traits or as a host for associated species, although aspen and alder are probably nearest overall. Work is under way, co-ordinated by the Joint Nature Conservation Committee, at UK level to better assess the likely biodiversity impacts.

A number of pre-existing national monitoring schemes and localised regional or site programmes have the potential to monitor changes following major alterations in woodland composition. However, some work is needed to improve the coordination and integration of these schemes if combining their outputs is to prove effective in helping to monitor overall impacts. In addition some of the methods need to be augmented, which may imply extra resources, if all pest and disease occurrence is to be picked up effectively. While the focus of much work so far has tended to be on woods, it is important that trees in hedgerows, the wider countryside and in urban areas are also monitored for impacts.

There is the potential to learn from what has happened in woods on the continent. Some monitoring has been set up in Europe following the outbreak of *C. fraxinea*, but little has yet been published on how woods and species are responding, possibly because in most case the baselines have been established only recently.

Managing for resilience

It was accepted that we need to respond to the specific threat from ash dieback, but more importantly to look ahead at how to develop woods that are more resilient to this and other potential impacts, including climate change.

Various factors combine to increase the vulnerability of the UK's trees and woods to external threats (pests, diseases, deer, squirrels, climate change), including the naturally narrow range of native species resulting from limited post-glacial colonisation. Many of the distinctive characteristics of British woods that we value in conservation terms (abundance of ash woods, rich open woodland communities, abundance of old pollards) are themselves a consequence of these same factors.

There is also a high degree of isolation and fragmentation of the UK's woods, and the effects of cultural management has been to create relatively uniform stands in terms of structure and composition.

There was agreement that increasing resilience would include encouraging greater diversity of species and provenance within woods. There was however debate as to whether within native woodland this should be limited to existing native species and to what extent this would depend on the nature of the wood and the objectives of the owner.

Good information exists on a range of non-native species from old provenance trials and early Forestry Commission plantings, but for some of the more 'innovative' species further work will be needed to judge how they will behave in UK conditions and to take account of any wider risks associated with their potentially wider usage.

The use of alternate species to mitigate the biodiversity impacts of pest and disease attacks will need to be based on securing favourable woodland conditions to support associated species. This will include species directly dependent on the tree, as well as those dependent on the woodland environment.

Selecting tree species which might support associated species of other taxa, such as invertebrates or epiphytes, depends on the tree species having similar characteristics to that which it is replacing, or for the associated species to have sufficiently wide habitat requirements to be able to switch tree species.

In the case of the wider woodland environment, considerations such as shade bearing, timing of leaf emergence, volume and chemical composition of leaf litter are all likely to be important in determining suitability to maintain current woodland conditions.

A further confounding issue with trees in the UK is the long history of tree planting, often with trees of unknown provenance. It is clear that much of the woodland creation through tree planting in the UK over the last century has not necessarily been with trees of local provenance and a significant proportion may be of non-UK provenance.

For both conservation and commercial purposes, where new planting, restocking or restoration is being undertaken, increasing the diversity of species and provenances planted to spread the risk of climate effects and threats from pests and diseases would seem to reduce the risk of catastrophic loss and increase the opportunities for selection.

It was considered that encouraging greater structural diversity in woodland would increase resilience. Some structural diversification will happen as a result of dieback of ash and other species. In the longer term it is likely to require changes to the ways that woods are managed. However, since only a small percentage of all woods are felled or thinned in any one year, changing the structure and composition of forests is likely to be a long-term process.

Much of woodland management in the UK relies on clear-fell and replanting systems; there is however good background knowledge on alternative silvicultural systems that might be used instead. A growing interest in irregular silvicultural systems – including continuous cover forestry – offer opportunities for developing species diversity and structural diversity. However, shelterwood systems may not be suitable to all circumstances.

Forests subject to high mortality and natural disturbance show greater speed of adaptation to climate change. Such impacts could be induced through forest management by thinning, shortened rotations or other management to speed natural regeneration. The suitability of this approach will depend on other objectives for the management of the site.

Woodland creation

Planting to increase tree and woodland cover could contribute to various objectives – timber production, nature conservation, landscape, water management etc – as well as contributing to increased resilience. The location, composition and structure of the new woodland will be important, both with respect to the vulnerability of the new woodland itself to the threats identified above and how it influences the broader resilience and vulnerability of the existing woods in the landscape.

In particular, expansion of woodland cover can help to buffer existing ancient woodland against external edge effects, provide new habitat and form part of habitat networks for woodland wildlife. While this could form an important element of increasing resilience to climate change, pests and disease and other external factors –planting to deliver a wider range of species, more structural diversity and improved genetic diversity – it is unlikely to have any significant direct effect on mitigating the spread of pests and diseases. However, such new woodlands, as part of better connected habitat networks, are likely to deliver improvements in the permeability of landscapes that would facilitate re-colonisation and dispersal of some wildlife species after damaging events.

Deer and squirrels

Many of the assumptions about how woods might respond to *C. fraxinea* and other threats, whether under active management or not, are heavily dependent on assumptions about the subsequent levels of damage that may occur as a result of deer and grey squirrels. While the exact level of threat posed by both deer and grey squirrels varies across the UK, increasing numbers and range of these species represents a significant problem.

The increase in deer numbers threatens both regeneration of woodland and ground flora, resulting potentially in significant changes in their composition or even their continued survival. In parts of the UK grazing and browsing may be leading to loss of total forest area or to significant negative impacts on woodland biodiversity.

Grey squirrels represent a threat to remnant red squirrel populations and to the quality and viability of broadleaved timber production. While localised control of grey squirrels can be effective in maintaining red squirrel populations, the widespread damage to timber quality is perhaps more challenging.

In light of the above, for many woodland owners, ash represented a good solution as one of the few species less susceptible to grey squirrel attack, and which often regenerates freely. The potential loss of ash makes species choice and the regeneration of woodland for timber production problematic both in existing broadleaved woodland and when developing restoration plans for Plantations on Ancient Woodland Sites (PAWS).

It is clear that for effective control of deer and squirrels, activity needs to happen at a landscape scale with cooperation across property boundaries. This can be problematic as not all owners perceive the same level of threat – for instance deer numbers and damage may not be significant to many farmers. Consideration needs to be given to how advice and grant support for forestry and woods can encourage active management of deer and squirrels at a landscape scale.

Research and knowledge transfer

There is widespread concern about the scarcity of researchers able to tackle some of the issues which forestry and tree management now face. The Tree Health and Plant Biosecurity Expert Taskforce report specifically highlighted the lack of forest pathology skills, but this is mirrored in various other fields. Forest Research as a GB body may also be vulnerable due to the impact of changes to the structure and funding of the Forestry Commission.

Concern was also expressed that the research that is available is not presented to end users in a way which is clear or addresses their practical needs. Within the forest industry in particular there is felt to be a need for clear and concise guidance which addresses the immediate and short term issues, such as species choice for restocking sites felled under Statutory Plant Health Notices e.g. larch infected with *Phytophthora*.

Woodland owners and managers value knowledge transfer from research, but this needs to give consideration to the other competing demands on the time and resources of the researchers too. More use could perhaps be made of online and digital technology coordinated across agencies and others presenting information to woodland managers and owners.

Summary conclusions

Areas of broad consensus

1. The scale of the threat facing the UK's trees and woods is significant and could impact on wildlife, environmental quality, the beauty and cultural significance of landscape as well as the productive capacity of woodland.
2. Prevention is the key to dealing with tree pests and diseases. There is a need to tighten 'biosecurity' through better control of plant imports – and to involve everyone who plays a part – plant importers, nurseries, retailers, through to the customers.
3. There is a need to understand and assess the risk of all the pathways of tree pests and diseases.
4. There is a need to respond to the specific threat from ash dieback, but more importantly to develop woods that will be more resilient to this and other impacts, including climate change.
5. The UK's trees and woods will be more resilient to pests and disease impacts, as well as other threats, if they contain a wider range of species, have good genetic diversity and a more diverse structure. Many of the issues affecting resilience need to be tackled at a landscape scale.
6. Deer and squirrel populations are serious problems which threaten measures to increase the resilience of the UK's trees and woodland.
7. There are important lessons to learn from experiences in Europe with *C. fraxinea* and other pests and diseases, accepting that some aspects of ecology will be different.

Areas with a lack of consensus

1. While there was agreement on the need to diversify species and ensure genetic diversity, the means of delivering this and the extent to which this should be pursued, especially within native woodland, was subject to differing views. In particular in relation to the use of non-UK provenances and the inclusion of non-native species in native woods.
2. Different values and approaches to woodland planting and management arise from differing views held by different types of owners, often with different objectives. This gives rise to differences of attitude and priority, and varying degrees of support or acceptance of alternative approaches.

Areas of uncertainty or lack of knowledge

1. For *C. fraxinea* it is not known how the disease will progress under UK conditions, how long infected trees will survive and what the response will be of the rest of the ecosystem.
2. There is currently a lack of clear understanding and assessment of the nature and scale of risk of all the pathways for tree pests and diseases.
3. While current monitoring schemes have the potential to monitor changes in woodland composition, work is needed to improve the coordination and integration of these schemes, especially if pest and disease occurrence is to be picked up.
4. There is a need for better collaborative dissemination of information from the industry to woodland managers and owners. Communications need to be clear and concise.
5. Clearer guidance is needed for forest managers and landowners relating to silviculture, restocking, and woodland expansion, both as a short term response to *C. fraxinea* but also longer term actions for increasing resilience.
6. Greater clarity needs to be available on suitable species and provenance for planting for the future in response to climate change in particular
7. There has been a loss of skills and expertise within the industry, particularly forest pathologists and university forestry departments. Further uncertainty hangs over the future of Forest Research.

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