

Operations Note 046b

30 April 2020

# Restocking woodland following loss of ash due to ash dieback

## Purpose

Guidance on restocking for owners and managers of woodland containing ash. This operations note gives an overview of considerations and signposts to appropriate sources of further information relevant to different management objectives. In addition it gives some instruction on use of the Ecological Site Classification tool.

All hyperlinks are expanded in the [Sources of further advice section](#).

## Context

Ash dieback is likely to continue to cause significant mortality of ash trees in woodland across England. The loss of a large proportion of ash, where it is a dominant species will have severe consequences for ecosystem function, biodiversity, landscape character and timber production. Maintaining tree cover on a site is generally desirable and is often required under [Felling Licence conditions](#). In addition, permission for any deforestation (including of natural regeneration) will be subject to [Environmental Impact Assessment](#).

Where the felling of dead or dying ash results in canopy gaps that will not close within ten years through growth of retained trees, these should be restocked with other species using natural regeneration or planting. This operations note contains advice on species choice for ash sites with a variety of management objectives. It is supplementary to the Forestry Commission guidance contained in:

- [Managing woodlands in light of ash dieback – operations note 46](#)
- [The management of individual ash trees affected by ash dieback – operations note 46a](#)
- [Managing woodland SSSIs with ash dieback](#)

For many woodlands, ash dieback demonstrates the need to increase resilience and often provides an impetus to do so. Establishing regular management to deliver an agreed management plan is an important part of this and to some extent is a prerequisite for the ability to respond and adapt to threats as they occur. Any management that takes place should seek to increase the resilience of the woodland to current and potential future threats including further pest & disease outbreaks and changes in climate.

## Advice for all management objectives

In-stand conservation of dieback tolerant ash is an important strategy for maintaining ash as a woodland species in the future. Where practicable, existing ash that stand out as being healthy should be retained and natural regeneration from these trees promoted. Woodlands with a high density of ash trees will be particularly important for this because fewer will remain healthy due to chance escape from the disease.

Where restocking is (or will later be) necessary, a component of natural regeneration from species other than ash may contribute to the species diversity of the stand, and to the maintenance of genetic diversity within those species. In addition, any regeneration will likely be well adapted to current site conditions and combined these factors should contribute to increased resilience to the impacts of climate change. The success of natural regeneration will depend on the presence of suitable parent trees and their pattern of mast years (heavy seeding), light levels, deer browsing, ground conditions/preparation, and the presence of seed predators.

Planting will offer more control over future stand composition and use of an appropriate mix of local and more southerly provenances of a range of site-suited species can also contribute to both species and genetic diversity. It is essential that planted species are suited to the site conditions and are capable of handling climate change impacts. It is recommended that nurseries are engaged as early as possible to ensure that high quality stock of desired species and provenance can be supplied. It is strongly recommended that UK grown planting stock is used to [minimise biosecurity risks](#) and that [Plant Healthy](#) certified producers are preferred as this scheme becomes established.

Establishment and maintenance requirements of planted trees should be considered at the planning stage with particular consideration given to shade tolerance, exposure risk, risk of mammal damage (vole, rabbit, hare, deer, and squirrel) and likely weed competition. Considerate harvesting and extraction will incorporate brash management and avoid major ground compaction & rutting, minimising the subsequent challenges in establishment.

In addition to increasing diversity of species and provenance, management for ash dieback provides a good opportunity to diversify the age structure of certain woodlands. Depending on the objectives of management, continuous cover management may then be appropriate and can further increase resilience. Information on how to implement these approaches is available in the following documents:

- [FC guide on Managing England's Woodlands in a Climate Change Emergency](#)
- [FC Policy & advice note on provenance choice of native species under climate change](#)
- [Forest Research webpages on continuous cover silviculture](#)

General good practice for managing ancient and native woodland in England to the United Kingdom Forestry Standard (UKFS) is contained in a [Forestry Commission Practice Guide – Managing ancient and native woodland in England](#).

## Using the Ecological Site Classification system

The Forestry Commission’s [Ecological Site Classification \(ESC\) Decision Support System \(DSS\)](#) can be used to support local expertise in an assessment of the suitability of a number of tree species to any site, both now and under projected future climates.

As part of running an ESC analysis, it is essential that agents and landowners dig soil pits and/or assess vegetation to [fully characterise the soils](#) (and their variability) on any site. This information should be used to confirm or amend the default soil type found in ESC. Models are rarely infallible and ESC outputs should be reality checked with the performance of tree species growing in the locality. This is especially critical on poor soils where ESC can sometimes underestimate suitability.

Table 1: National Vegetation Classification (NVC) woodland types often containing large components of ash and associated Soil Moisture (SMR) and Nutrient (SNR) Regimes used in Figure 1.

<b>NVC Woodland type</b>	<b>Typical locations</b>	<b>SMR, SNR used in Figure 1 and Appendix 1</b>
W7: Alder-ash-yellow pimpernel	Moist to very wet, moderately base-rich mineral soils and where there is little chance of peat accumulation	3.0(Very moist), 5.0(Very rich)
W8: Ash-field maple-dogs mercury	Various calcareous soils mainly in lowland southern Britain. Naturally ash dominated. Soils overlap with W12 with W8 tending to be associated with slightly deeper soil	6.0(Slightly dry), 5.0(Very rich)
W9: Ash-rowan-dogs mercury	Permanently moist calcareous soils in sub-montane north-west Britain. Cool, wet and windy compared to W8 and W12	4.0(Moist), 5.0(Very rich)
W10: Oak-bracken-bramble	Neutral brown earths mainly in lowlands of southern England. Sometimes ash dominated where oak and other species have been removed through historic management	5.0(Fresh), 4.0(Rich)
W12: Beech-dogs mercury	Free-draining calcareous soils in the southern lowlands, typically on steeper faces of chalk escarpments. Sometimes ash dominated where areas subject to historic disturbance have regenerated with ash	6.0(Slightly dry), 6.0(Carbonate)

Figure 1 is an overview of ESC-DSS outputs at typical examples of five woodland types which often contain large components of ash. The National Vegetation Classification (NVC) system can be a useful way to broadly distinguish site types and has been used here to characterise the five native woodland types. Brief descriptions of the relevant

NVC types are given in [Table 1](#) along with the soil type used in the analyses. It is worth noting that species composition on the ground may have been altered by human intervention and that the natural composition of NVC woodland types may alter under climate change.

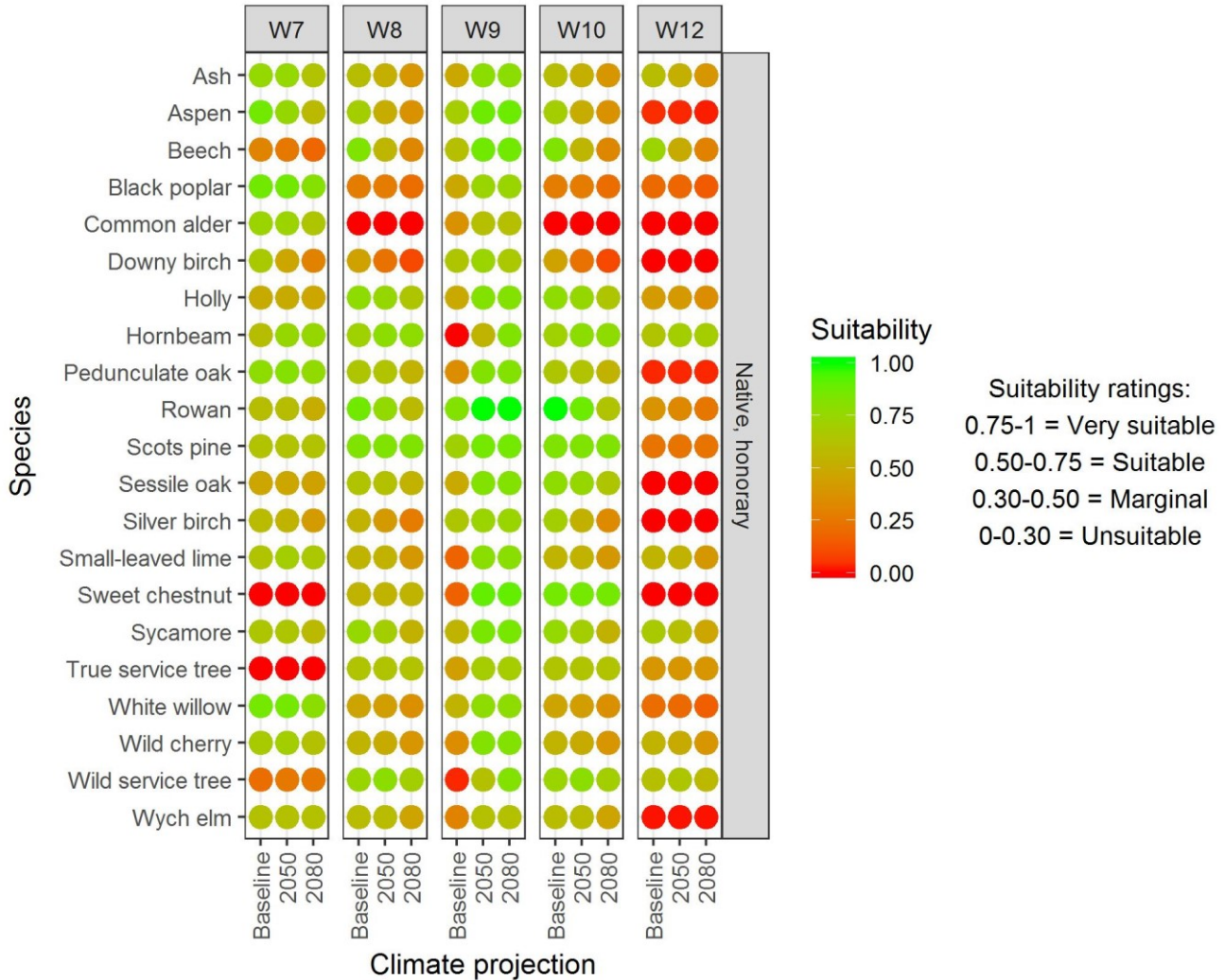


Figure 1: Suitability of native and honorary native tree species on typical woodland types often containing large ash components. Data derived from Forestry Commission ESC-DSS using a medium-high emissions scenario and the Available Water Content (AWC) method. Baseline is 1960 - 1990.

**Figure 1 offers a rough guide to species suitability but should not be used as a substitute for carrying out ESC analyses specific to a site.** Soils inputs used in the analyses (see [Table 1](#)) have been chosen based on example sites and these may differ from other sites of the same NVC class in a variety of ways leading to markedly different suitability scores. For example a W12 with deeper soils may be closer to the soils used in the W8 shown and vice versa (NVC classes often bridge a range of soil moisture and nutrient categories). In addition, the current climate conditions or the effects of a changing climate on for example W10 woodland in one part of the country may be very different to that in another.

The Available Water Content (AWC) option in ESC-DSS has been used in the analysis behind [Figure 1](#). This improves the predictions by integrating the water holding capacity of different soil types into the analysis.

It is important to note that hazel, hawthorn, field maple, whitebeam and yew do not feature in ESC but will grow well on some ash sites and should be considered as part of a species mix for certain management objectives. The latter three of these may be useful options on W12 sites where alternative restocking options are limited.

On a limited number of sites it may be possible to maintain a component of non-native species. A similar figure covering non-native species is contained in [appendix 1](#). It is also worth noting that ESC models are based on the performance of trees from origins historically grown in the UK. Human led adaptation measures such as assisted migration may enhance suitability for some species to above that suggested by ESC.

### Advice for specific management objectives

#### Where timber production is a significant management objective

Further information on suitable ash replacement species and their production potential is available in [Broome et al., 2019](#) (particularly see table on page 9 [116]). In addition, the [RFS species profiles](#) discuss the silvicultural attributes of a subset of non-native alternative species in detail (paper 11 by Savill et al. (2017) specifically contrasts to ash). Further detailed silvicultural guidance on managing woodlands affected by ash dieback is contained in [Skovsgaard et al., 2017](#). Further general information on species choice can be found on the [Forest Research website](#).

#### Where ash associated biodiversity and/or ecosystem function is a significant management objective

Where the support of biodiversity or ecosystem functioning associated with ash is a concern, tree species choice may be adjusted to better deliver these objectives. Significant research has been carried out on this and different strands are outlined in a [Forestry Commission Research Note](#) and a summary of [management recommendations](#) from research by [Hill et al \(2019\)](#).

With regard to ESC-DSS outputs, 'ecological suitability' (surviving on a site) is sometimes slightly higher than 'timber suitability' (growing with vigour) for a species. Species scored as Marginal may still be ecologically suitable to a site although the health of a tree may be compromised inhibiting its resilience to future stresses.

## Grants for restocking following the loss of ash

Grants are available from the Forestry Commission under the Countryside Stewardship scheme to help with the costs of restocking areas affected by ash dieback. The [Woodland Tree Health grant](#) offers capital funds for farmers and land managers to supply, plant, weed and protect young trees when restocking woodland after tree health problems. Proposals must be appropriate and agreed in advance by the Forestry Commission. If you are considering applying for a grant and want to discuss this [please contact your local Woodland Officer](#).

## Sources of further advice

Biosecurity information, GOV.UK, available at: [www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases](http://www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases)

Continuous cover forestry overview page, Forest Research, various, available at: [www.forestresearch.gov.uk/research/continuous-cover-silviculture](http://www.forestresearch.gov.uk/research/continuous-cover-silviculture)

Countryside Stewardship Tree Health Grants, GOV.UK, available at: [www.gov.uk/guidance/woodland-tree-health-grant-countryside-stewardship](http://www.gov.uk/guidance/woodland-tree-health-grant-countryside-stewardship)

Ecological Impacts of Ash Dieback and Mitigation Methods, Ruth Mitchell, Alice Broome, Forest Research, 2017, available at: [www.forestresearch.gov.uk/research/ecological-impacts-of-ash-dieback-and-mitigation-methods](http://www.forestresearch.gov.uk/research/ecological-impacts-of-ash-dieback-and-mitigation-methods)

Ecological Site Classification tool for identifying site type and selecting appropriate species, Forest Research, available at: [www.forestresearch.gov.uk/tools-and-resources/forest-planning-and-management-services/ecological-site-classification-decision-support-system-esc-dss](http://www.forestresearch.gov.uk/tools-and-resources/forest-planning-and-management-services/ecological-site-classification-decision-support-system-esc-dss)

Environmental Impact Assessment information, GOV.UK, available at: [www.gov.uk/guidance/assess-environmental-impact-before-felling-trees](http://www.gov.uk/guidance/assess-environmental-impact-before-felling-trees)

Felling Licence information, GOV.UK, available at: [www.gov.uk/guidance/tree-felling-licence-when-you-need-to-apply](http://www.gov.uk/guidance/tree-felling-licence-when-you-need-to-apply)

Forestry Commission Woodland Officer contacts list, GOV.UK, available at: [www.gov.uk/government/organisations/forestry-commission/about/access-and-opening#area-offices](http://www.gov.uk/government/organisations/forestry-commission/about/access-and-opening#area-offices)

Genetic considerations for provenance choice of native trees under climate change in England, Forestry Commission, Natural England, 2019, available at: [www.gov.uk/government/publications/provenance-choice-of-native-trees-under-climate-change-in-england-policy-advice-note](http://www.gov.uk/government/publications/provenance-choice-of-native-trees-under-climate-change-in-england-policy-advice-note)

Maintaining ecosystem properties after loss of ash in Great Britain, L Hill, G Hemery, A Hector, N Brown, J Appl Ecol. 2019; 56: 282–293, available at: [www.doi.org/10.1111/1365-2664.13255](http://www.doi.org/10.1111/1365-2664.13255) (open access), summarised Management Recommendations from this research available at: [jappliedecologyblog.files.wordpress.com/2018/09/ad-management-recommendations.pdf](http://jappliedecologyblog.files.wordpress.com/2018/09/ad-management-recommendations.pdf)

Managing Ancient and Native Woodland in England Practice Guide, Forestry Commission, 2010, available at: [www.gov.uk/government/publications/managing-ancient-and-native-woodland-in-england](http://www.gov.uk/government/publications/managing-ancient-and-native-woodland-in-england)

Managing England's Woodlands in a Climate Change Emergency, Forestry Commission, 2019, available at: [www.gov.uk/government/publications/managing-englands-woodlands-in-a-climate-emergency](http://www.gov.uk/government/publications/managing-englands-woodlands-in-a-climate-emergency)

Managing woodland SSSIs with ash dieback, Forestry Commission & Natural England, available at: [www.gov.uk/government/publications/managing-woodland-sssis-with-ash-dieback-hymenoscyphus-fraxineus](http://www.gov.uk/government/publications/managing-woodland-sssis-with-ash-dieback-hymenoscyphus-fraxineus)

National Vegetation Classification field guide to woodland, Hall, J.E., Kirby, K.J. & Whitbread, A.M. (revised 2004), JNCC, Peterborough, ISBN 1 86107 554 5, available at: [www.hub.jncc.gov.uk/assets/673dc337-e58f-4f6b-ac7b-717001983c2e](http://www.hub.jncc.gov.uk/assets/673dc337-e58f-4f6b-ac7b-717001983c2e)

Noble Hardwood Alternatives to Ash, P. Savill, B. Mason, R. Jinks, S. Wilson, Quarterly Journal of Forestry, 2017, 111(3): 166 – 182, Paper 11 available at: [www.rfs.org.uk/learning/forestry-knowledge-hub/forest-resilience/alternative-tree-species](http://www.rfs.org.uk/learning/forestry-knowledge-hub/forest-resilience/alternative-tree-species)

Operation notes on managing woodland (ON46) and non-woodland trees (ON46a) affected by ash dieback, Forestry Commission, available at: [www.gov.uk/government/collections/forestry-commission-operations-notes-england](http://www.gov.uk/government/collections/forestry-commission-operations-notes-england)

Plant Health Management Standard, Plant Healthy, available at: [www.planthealthy.org.uk/](http://www.planthealthy.org.uk/)

Responding to ash dieback (*Hymenoscyphus fraxineus*) in the UK: woodland composition and replacement tree species, A Broome, D Ray, R Mitchell, R Harmer, *Forestry: An International Journal of Forest Research*, Volume 92, Issue 1, January 2019, Pages 108–119, available at: [www.doi.org/10.1093/forestry/cpy040](http://www.doi.org/10.1093/forestry/cpy040) (open access)

Silvicultural strategies for *Fraxinus excelsior* in response to dieback caused by *Hymenoscyphus fraxineus*, Jens Peter Skovsgaard, Georg Josef Wilhelm, Iben M. Thomsen, Berthold Metzler, Thomas Kirisits, Ludmila Havrdová, Rasmus Enderle, Dorota Dobrowolska, Michelle Cleary, Jo Clark, *Forestry: An International Journal of Forest Research*, Volume 90, Issue 4, October 2017, Pages 455–472, available at: [www.doi.org/10.1093/forestry/cpx012](http://www.doi.org/10.1093/forestry/cpx012) (open access)

Species and provenance choice overview page, Forest Research, various, available at: [www.forestresearch.gov.uk/tools-and-resources/tree-species-and-provenance](http://www.forestresearch.gov.uk/tools-and-resources/tree-species-and-provenance)

The identification of soils for forest management (Field Guide), Fiona Kennedy, Forestry Commission, 2002, can be ordered (£17) at:

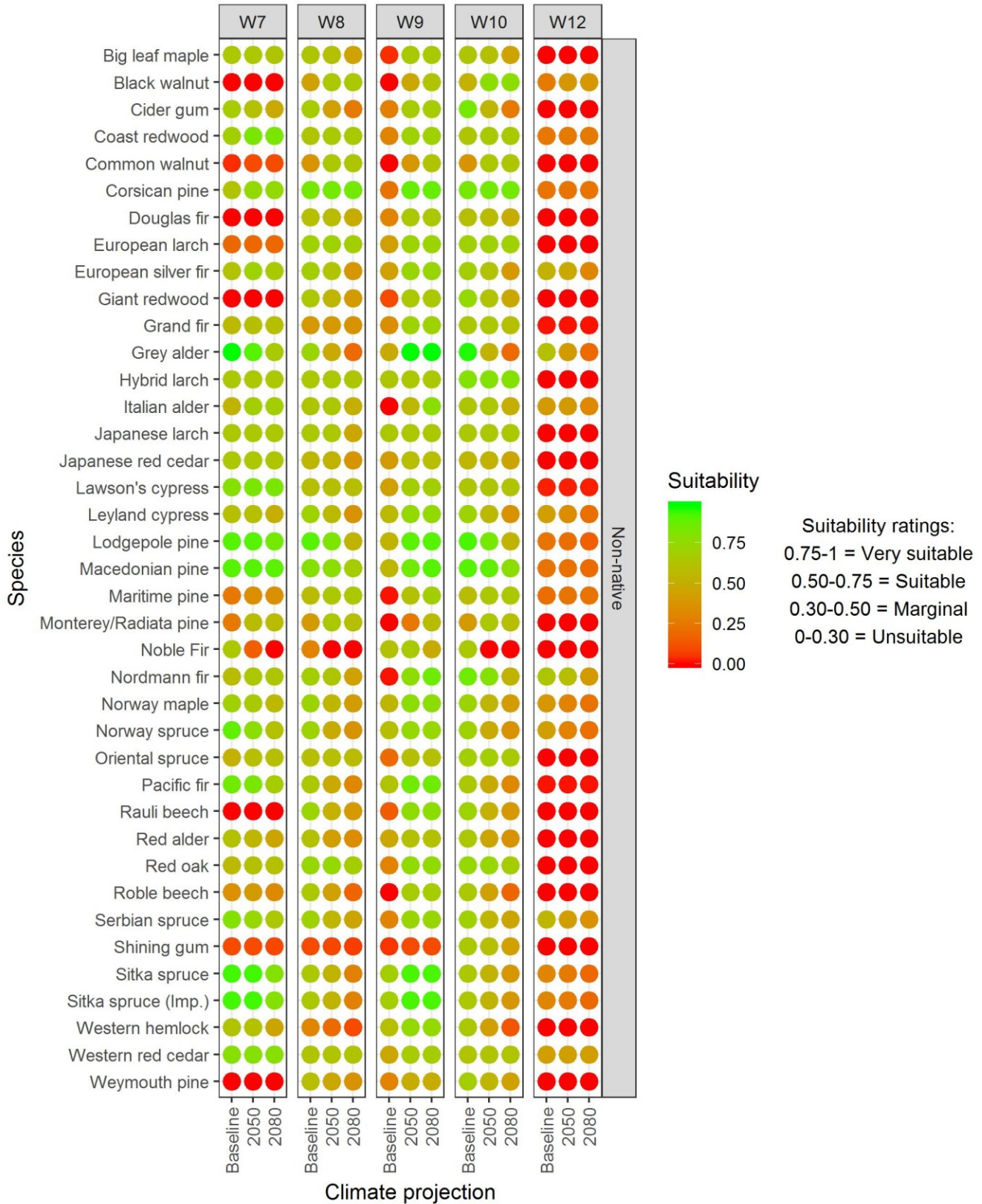
[www.forestresearch.gov.uk/research/the-identification-of-soils-for-forest-management/](http://www.forestresearch.gov.uk/research/the-identification-of-soils-for-forest-management/)

## Versions

Version 1 issued - 30 April 2020



Appendix 1



Suitability of non-native tree species on typical woodland types often containing large ash components. Data derived from Forestry Commission ESC-DSS using a medium-high emissions scenario and the Available Water Content (AWC) method. Baseline is 1960 - 1990.