



Alice Holt Climate Change Adaptation Trail Guide

Start: Alice Holt Arboretum car park

Post code: GU10 4LQ (nearest)

Distance: 3 miles with 7 marked stops

Terrain: Wide forest roads which may cross uneven patches of mud and puddles

In south-east England, climate change has already had an impact on trees and woodland and will continue to do so. Oak now comes into leaf nearly a month earlier than it did in the 1950s. In future, this area is projected to become warmer, with more frequent extreme weather events, such as hotter, drier summers and drought episodes.

The trail demonstrates a range of different adaptation measures that can be used to better prepare our woodlands for change and future challenges. The first two stops are managed to show different ways in which Alice Holt Forest is being adapted. The other stops are 20th century research trials that are of fresh interest in light of climate change.

If you're interested in forestry and perhaps own or manage woodland, the accompanying **online worksheet** provides more detail.

Stop 1 Can we increase resilience using species pairing mixtures?

Mature Corsican pine (*Pinus nigra*), underplanted in 2017/18 with two broadleaved species, of different drought tolerances, to meet woodland restoration objectives.

Corsican pine has an uncertain future due to its vulnerability to drought and disease damage. The current mature stand is growing on sandy soil and has been underplanted with either hornbeam (*Carpinus betulus*) or beech (*Fagus sylvatica*). Hornbeam is expected to perform better than beech in future because it has a higher drought tolerance.

Stop 2 Can we reduce drought impact by thinning?

Young Corsican pines were thinned in 2018 at two different intensities, in two adjacent sub-compartments, to try to extend the expected yield of this stand. Hotter, drier summers will increase competition for water but there should be less drought stress in trees where heavier thinning has been undertaken.

Stop 3 Can we encourage natural selection using direct seeding?

A trial plot of 10 different tree species was sown, rather than planted, in 2009 using different types of typical farm machinery. The resulting woodland on former agricultural land established quickly in three years.

Direct seeding can result in many more seedlings compared with planting, which may encourage adaptation through natural selection. Fencing to protect seed and seedlings was critical for establishment. Correct ground preparation and weeding were also important. This stop shows that direct seeding can be successful, and strong, upright stems are encouraged by the high density of seedlings.

Stop 4 What are our options to address changing fire risk?

A trial of coast redwood (*Sequoia sempervirens*) involved testing the growth and survival of plants raised from seed from different origins. Coast redwood grows well in a British climate and is available in many nurseries. The species can reach 20 metres in 20 years and is highly valued for its timber qualities. It is lightweight, shows resistance to decay and is resilient to fire.

However, it does show some sensitivity to frost when young. Coast redwood is now being considered as part of Forestry Commission England's diversification strategy.

Stop 5 What can species trials tell us about future risks? Leyland cypress clone bank

This windblown stand of different clones of Leyland cypress demonstrates the importance of trial plots to highlight potential issues with novel species before they're grown commercially. Such trials are important given that extreme weather events are expected to increase in future.

This species was found to be susceptible to wind throw. The stand survived high winds in 1987 but was blown over during a storm in 2012/13. The trial has been abandoned.

Stop 6 What alternative species might suit future conditions?

(Optional – skip if you're short on time or have access difficulties.)

This clone bank of western red cedar (*Thuja plicata*) was planted in 1964 from cuttings taken from superior specimens in forests across the UK. Western red cedar is a conifer that has potential for wider use in forestry for timber. Here, however, their dense foliage has blocked light from reaching the forest floor and so there is low potential for ground flora and associated wildlife. But alternative planting strategies could be considered to improve potential for wildlife. The stand established well on a north-facing slope with no thinning and today serves as a source of genetic material for future breeding and selection programmes.

Stop 7 Understanding species diversification

The arboretum and rare tree collection highlights how species diversification and valuable conservation work are important in understanding threats and opportunities from the changing climate. Volunteers from the Alice Holt Community Forum are helping to conserve rare species and identify those that may tolerate future climatic conditions. aliceholtforum.org.uk/ahcf/arboretum/

Stop 8 (Optional) Mixtures of broadleaved species

Once you've completed the trail, there is one more stop a few minutes' drive away in Alice Holt Forest Park. Leave your car in the 'Beech' Forest Centre car park and follow the **Easy Access Discovery Trail** along Orchard Ride. Take the first turning on your left to follow a mile-long loop.

This stop shows the performance of natural beech regeneration (where trees develop from seeds that fall and germinate *in situ*) alongside an area underplanted with UK oaks and one underplanted with oaks from France. Trees from southern areas may perform better in future but we need to find out more about how they will cope and grow in different climatic conditions, such as in changing rainfall patterns here at Alice Holt.

What did you think of the stops on the trail and the questions they raise? If you're adapting the woodlands you manage to climate change, we'd love to hear about your results. You can share your thoughts and get in touch with us [@Forest_Research](https://twitter.com/Forest_Research) using [#AdaptAH](https://twitter.com/AdaptAH).

This trail has been produced by Forest Research in collaboration with Forestry Commission England.

Further information is available at www.forestresearch.gov.uk or you can send us an email at adaptah@forestry.gsi.gov.uk



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