

Project Report:

An exploration of the ancient woodlands of the UK: lessons horticulture can learn from how trees, understory and fungi grow together in these special habitats.

A. McKeever, June 2019

Contents

- ❖ Introduction
- ❖ Aims and objectives
- ❖ Itinerary
- ❖ Locations
- ❖ Work programme
- ❖ Problems encountered
- ❖ Conclusion
- ❖ For the future
- ❖ Final budget
- ❖ Acknowledgments
- ❖ Bibliography
- ❖ Appendices

Introduction

I began my apprenticeship in botanical horticulture at the Royal Botanic Gardens, Kew in August 2018, and will graduate in August 2020. I moved into horticulture from a career as a copywriter and translator the year before, beginning with volunteer work on a Californian cannabis farm, followed by volunteering in London with The Conservation Volunteers in community gardens, Royal Parks and cemeteries; work in Alexandra Palace garden centre; and also in private gardens in West London.

As an apprentice at Kew I have two weeks special leave for a horticultural travel project to enrich my studies. Through research and many conversations with professionals at Kew I decided on a project entitled, '**An exploration of the ancient woodlands of the UK: what lessons can horticulture learn from how the trees, understory and fungi grow together in these special habitats**'.

I came to horticulture through a love of trees and forests. Beginning with woodlands in and around London. I extended this abroad during visits to the redwoods of California and Japanese red cedars of Yakushima, where I experienced some of the world's largest, oldest and most magnificent trees. Presented with the opportunity of again travelling to learn more about the world's plants, I was drawn to the native plants and habitats of the place where I grew up and now live and work; in particular its remaining ancient woodlands.

An ancient woodland is defined as a woodland that has been present since 1,600AD in England, Northern Ireland and Wales, or since 1,750AD in Scotland; they currently cover around 2% of the UK. They are the link to the wildwood that originally covered the British Isles around 10,000 years ago; however it is unlikely that any of it can be said to be really 'wild', or, truly unaffected by human activity.

The longevity of an ancient woodland lends it certain traits: in particular the soil, having been left undisturbed for centuries, gives rise to a rich combination of fungi and organisms which have a great effect on the growth of plants. Due to an active geological history, the UK has a very diverse geology and landscapes, and therefore so do its woodlands.

Each woodland type relates to the geology and climate of its region, some of them being entirely endemic to that region and many of them classified as the Department of the Environment, Food and Agriculture (DEFRA) Special Areas of Conservation (SAC) or Sites of Special Scientific Interest (SSSI) by DEFRA.

The five types represented in this proposal are: Taxus woodland growing on the lowland calcareous substrates of West Sussex; the lowland oak-ash woodlands of the Cambridgeshire Hundreds, the highland oak woodland of Sherwood Forest, the Caledonian pinewoods of Benn Eige, and the Atlantic coast oak woods of Ariundle.

In my current position as horticultural apprentice, this project offered me many learning opportunities: an understanding of the interaction between plant and habitat, through the specifics of the British landscape; the chance to improve my plant identification and observation skills, botanical photography skills; and the chance to gain a deeper knowledge of the soil, climate, landscapes and plants that grow in the UK – where I am most likely to be looking to work as a horticulturist once my apprenticeship ends.

As part of the proposal I planned to attend the Ancient Tree Forum's summer forum in Sherwood Forest – two days of talks and workshops on the science and management of ancient and veteran trees - where I hoped to improve my understanding of the growth and care of trees and to meet a range of people who work with trees. Additionally, I hoped to meet with and potentially shadow the managers of each woodland site I visited in order to gain further insights on the habitats they work with, and to see first hand what kind of techniques are used to maintain these kinds of sites.

Aims and objectives

Aims

- To gain knowledge of the native plants and woodland plants of the UK
- To improve plant identification skills
- To improve botanical photography skills
- To compare the effects of the different habitats across the UK on certain plants
- To share information with the Royal Horticultural Society (RHS) and other potential funders

Objectives

- To visit various woodland habitats of the UK
- To attend the Ancient Tree Forum
- To gain work experience with the Ancient Tree Forum and Nature Reserve managers
- To observe and record plants with notes and photographs
- To write a detailed report on the visit for the RHS and other potential funders
- For this report to be help in the RHS Wisley library for public consultation
- To give a presentation to my colleagues at Kew

Itinerary

Fri 21/06 Day 1:	Drive to Kingley Vale 1.30h (after college)
Sat 22/06 Day 2:	Visit Kingley Vale Nature Reserve / Meet with Reserve manager, tour and/ shadow their work
Sun 23/06 Day 3:	Visit Kingley Vale Nature Reserve / Meet with Reserve manager, tour and/ shadow their work + Drive to West Cambridgeshire Hundreds 2.20h
Mon 24/06 Day 4:	Visit West Cambridgeshire Hundreds / Join BCN Wildlife Trust survey
Tue 25/06 Day 5:	Visit West Cambridgeshire Hundreds / Join BCN Wildlife Trust survey
Wed 26/06 Day 6:	Half rest day + Drive to Sherwood Forest 1h45
Thur 27/06 Day 7:	Ancient Tree Forum - Sherwood Forest
Fri 28/06 Day 8:	Ancient Tree Forum - Sherwood Forest
Sat 29/06 Day 9:	Drive to Ariundle 7h20
Sun 30/06 Day 10:	Rest day

Mon 01/07 Day 11: Visit Ariundle Nature Reserve / Meet with Reserve manager, tour / shadow their work
Tue 02/07 Day 12: Visit Ariundle Nature Reserve / Meet with Reserve manager, tour / shadow their work
Wed 03/07 Day 13: Half rest day + Drive to **Beinn Eighe** 3h45
Thur 04/07 Day 14: Visit Beinn Eighe Nature Reserve / Meet with Ben Eighe Nature Reserve manager, work experience
Fri 05/07 Day 15: Visit Beinn Eighe Nature Reserve / Meet with Ben Eighe Nature Reserve manager, work experience
Sat and Sun 06/07 July Day 16 and 17: Drive home

Locations visited:

Kingley Vale, West Sussex: lowland *Taxus* woodland. *Taxus baccata* on calcareous substrates is a habitat particular to the UK. This *Taxus* forest represents potentially the oldest living things in Britain, as well as the finest example of *Taxus* forest in Europe.

Gamblingay Wood, the West Cambridgeshire Hundreds: lowland mixed oak woodland: a 1,000 year old mixed woodland with *Quercus*, *Fraxinus* and *Acer*, *Corylus* and *Crataegus*. The wide variety of plants here is due to the area's soil range, with *Pteridium*, *Primula*, and *Digitalis* growing on the sandier soils; *Hyacinthoides*, *Primula elatior* and *Anemone nemorosa* on the clay soils.

Sherwood Forest, Nottinghamshire: highland oak woodland, home of the Major Oak - a *Quercus Robur* around 1,000 years old; and the location for the 2019 Ancient Tree Forum summer forum - a two day conference looking at the growth of ancient trees.

Ariundle, Argyll: Atlantic oak woods - ancient oak woods which once covered the western coast of Britain, with *Quercus*, *betula* and many species of mosses, liverworts, lichens, fungi and ferns growing there due to the mild wet Atlantic climate.

Beinn Eighe, Ross & Cromarty: Caledonian pinewood - one of the oldest and least disturbed examples of Caledonian pinewood - ancient woods which link Scotland with the rest of world's boreal forests. The *Pinus sylvestris* woods grow on thin, infertile, mineral soils across Scotland, with a range of *Betula*, *Sorbus*, *Alnus*, *Salix*, *Ilex* and *Corylus* present in the milder west coast, and a variety of Scotland's rare tooth fungi.

Work programme:

Kingley Vale

At Kingley Vale I had the opportunity to observe the pure *Taxus* woodland - a particularly rare type of woodland native to the UK. These stands of *Taxus* are incredibly beautiful - barely anything else can compete with the *Taxus*, leaving the ground clear with a light covering of moss and one or two *Sorbus aria* dotted around. The *Taxus* grow with their own natural spacing which gives an incredibly beautiful symmetry and calm, enhanced by the simplicity of this habitat. The canopy is closed but lets through light in the most beautiful patterns:



Shadows under Taxus baccata.

Unfortunately the Kingley Vale reserve manager was unable to meet me as planned. I took this as an opportunity to make my own observations and take my time in photographing the plants and trees of the site. One of the first features I noted is the way in which plant life changes as you climb higher. As you arrive on the reserve, on the lower deeper soil the woodland is mixed, with *Quercus robur*, *Fagus sylvatica*, some *Taxus baccata* and *Crataegus monogyna*, *Sorbus aria*, *Fraxinus excelsior*, *Rosa canina*, and many spotted orchis (*Dactylorhiza fushii*). There are stands of very large ancient *Taxus* but no pure *Taxus* woodland. This is partly due to humans felling *Taxus* centuries ago for longbows – though it is also because fewer plants are able to grow on the higher thinner soil. *Calcerous substrates at Kingley Vale.*

As you mount further the site opens out into a cleared meadow where wildflowers grow, and further still you reach the steeper soil where you find the pure *Taxus* stands.



Papaver somniferum and *Digitalis purpurea*



Pure Taxus baccata woodland and Swans neck thyme moss Mniun hornum - one of the few other plants growing there.

I decided to measure one of the larger ancient *Taxus* to determine its age, measuring *Taxus* at 1 foot from the ground, five foot from the ground and at the widest girth.



This Taxus was 15 feet 3 inches / 4.6 m girth giving it an age of between 600 and 700 years.

I left this site struck by the potential aesthetic inspiration horticulture can take from *Taxus* woodlands. *Taxus* are encountered so often as manicured hedges, but what about naturalistic *Taxus* woodland in gardens? Woodland gardens are of particular interest right now The Resilience Garden at RHS Chelsea this year is one example - showcasing what horticulturists can do when inspired by forests and woodlands.

Gamlingay Wood and Sugley Wood

The site at Gamlingay encompasses a mixed ancient woodland, a four-hundred-year-old coppice woodland, and some remaining non-native pine stands from plantation days.

The area is notable for the wide range of plants growing there, as mentioned above, but also for an initiative taken up by the local community together with the Woodland Trust who have bought the land adjacent to Gamlingay in order to allow a 'new' ancient woodland to grow - Sugley Wood. The area was last woodland in 1600 and has been farmland ever since. In 2002 the farming on the land ceased, and within two years saplings of local woodland tree species were already covering the land. I met with Colin Carpenter from the community nursery Bedfordshire Trees, where a selection of ash, oak, hazel, hawthorn and field maple are grown from collected seed from the area, to be planted out in Sugley Wood. Local schools also helped by collecting seeds from Gamlingay and dispersing them across the land. Over the next 200 years the land will gradually shift from cropped field to meadow, then scrub and eventually back to its original woodland.

Hearing about this venture got me thinking about the potential for horticulturists and conservationists to work together in this way, particularly in urban areas like London.



Sugley Wood - an ancient woodland in the making. Phasing from meadow to scrubland with ash, oak, hazel, hawthorn, and field maple saplings growing.



Corylus avellana coppicing at Gamlingay's centuries old wood coppice.

Sherwood Forest and the Ancient Tree Forum

At Sherwood Forest I attended the Ancient Tree Forum over two days - with morning talks at a local hotel, and site visits in the afternoons.

I learnt a huge amount in these two days and met many interesting people, including other horticulturists, arboriculturists, artists, ecologists, conservationists and mycologists. I made many contacts, some of whom I am already planning to meet with, with plans to shadow an arboriculturist, and visit two different tree nurseries.



I met a great many experts amongst the speakers and also the attendees of the forum – one of whom showed me how to distinguish between the fine root hairs (left) and mycellium found in the roots of a veteran Quercus robur in Sherwood Forest.

There were a wide range of talks given (full itinerary in apendices), including the historical management of Sherwood Forest and how that has created the landscape today, the saproxylic invertebrates that live at Sherwood, the importance of considering fungi before everything else, and the techniques used to care for and manage the ancient trees at Sherwood, including a heated debate as to how the famous Major Oak should be mulched.



The famous Major Oak at Sherwood Forest. 10 metre wide trunk, a 28 metre wide canopy and almost 1000 years old.

My overall impression from the many talks given, was that a horticultural education is never over. There is such a huge amount to be learnt about ancient trees, as well as all trees, plants, fungi and their associated fauna. Gaining one answer always leads to more questions, and there are always new and different ways of doing things.

Ariundle

I found the Ariundle oak woods an incredibly rich and lush landscape. The woodlands are overflowing with mosses and lichens and moisture.



Ariundle ancient oaks with Quercus robur and Quercus patraea on the left, with pure birch (Betula pubescens) stands on the right, both thickly carpeted with mosses and grasses.

Here, I had the disappointment of one more cancellation from the reserve manager, so I busied myself with observing the plants and lichens and photographing the woodlands. I was principally struck by the sheer volume of growth here - an effect of the wetter west coast of Scotland, and warmth brought by the Gulf Stream.

I met with local ecologist Eric McVicar, a specialist in sustainable ecology and ecosystems, who spoke to me of the importance of eliminating and not introducing any further foreign species to these special areas - whether plant or animal. One such foreign plant is *Rhododendron ponticum* which has been particularly devastating to UK woodlands as it can smother other plants and trees - growing over them and preventing them from reaching the light, and also carrying the disease sudden oak death (*Phytophthora ramorum*) as well as toxicity in the leaves dangerous to local invertebrates, mammals and birds.

Particularly interesting to observe was how the local lichens and moss will not even grow on *R. ponticum* while covering local trees. I learnt that this is debated to be due to either the toxicity mentioned above, or another effect of the *Rhododendron* species which is to inhibit mycorrhizal development essential to plant, moss and lichen growth.



Wood cut from native *Betula pubescens* (left) and introduced *Rhododendron ponticum* (right) – from plants growing adjacent to each other, showing the difference in lichen growth.

Beinn Eighe

On my last stop at Beinn Eighe nature reserve I spent the majority of the time working in the reserve's nursery, where the reserve staff grow seedlings of the areas special *Pinus sylvestris*. Just before this trip, I had been working in Kew's own arboretum nursery so it was fantastic to experience and compare nursery work in such a different environment with quite dissimilar styles of working.

I also learnt about how these particular Scots pine trees at Beinn Eighe have been recognised recently by the 'EuforGen' programme for their genetic makeup, which differs to that of the other Scots pine, even in nearby Scottish forests.

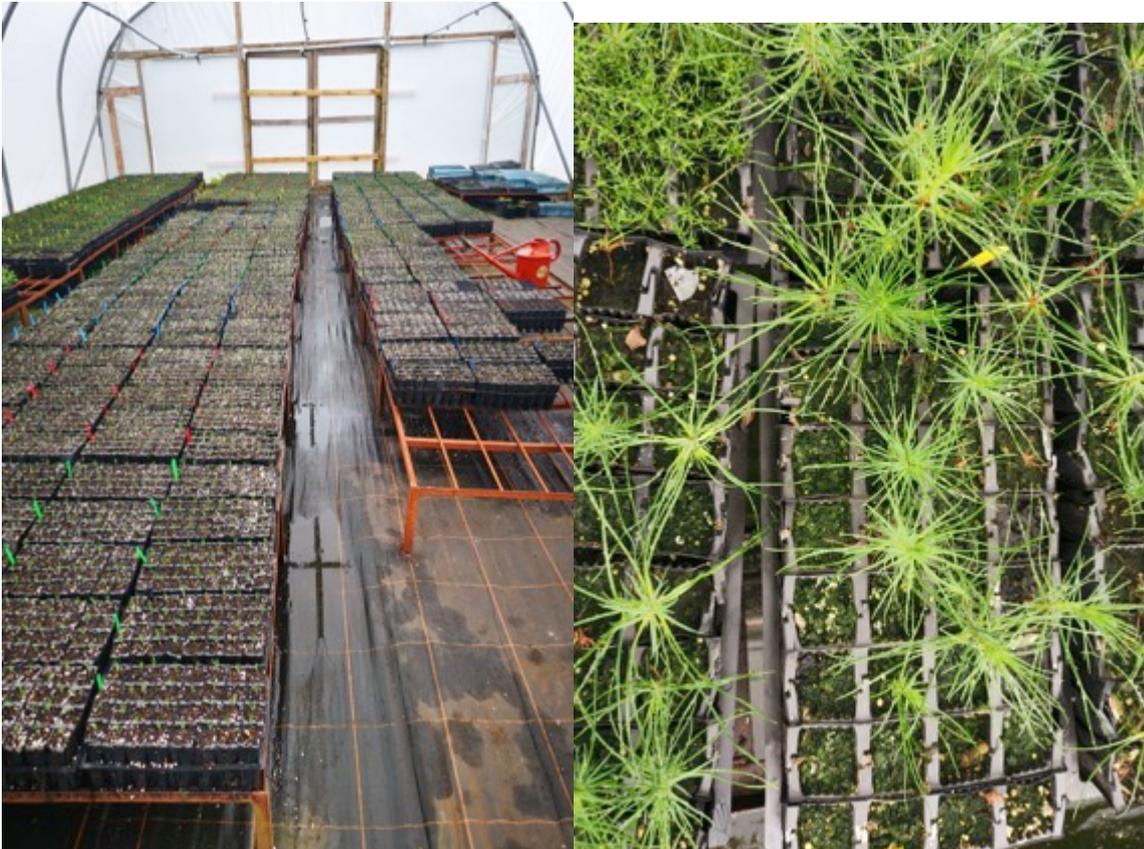


Beinn Eighe's special Pinus sylvestris

In the Beinn Eighe nursery they are growing around 40% scots pine and 60% alder, birch, rowan, salix, and holly, with some juniper and aspen.

They are the only nursery permitted to plant in the buffer zone of the Calidonian Pine forests of Scotland. The buffer zone was put in place to protect the forests from red band needle blight, which has been problematic in the area.

In the nursery I worked on potting up scots pine seedlings as well as collecting aspen suckers and then propagating these aspens - a technique new for me which was great to learn.



Thousands of Pinus sylvestris seedlings growing at Beinn Eighe nursery – a total of 30 000.

Another interesting lesson I learnt at Beinn Eighe was the importance of deer stalking and also how to ladder. Deer are the main threat and pest to the Scotland's calidonian pine forests, as they eat saplings or trample them with their footfall and so the reserve staff are principally occupied with deer stalking. Early one morning I helped staff to ladder the deer they had caught that day. The deer are gutted on the mountain to leave the nutrients to go back into the soil, then laddered back at the reserve office, and sold on to butchers, with the money made going back into the reserve. I found to be quite an interesting lesson in combining pest management with sustainability.

One final great experience of the trip was on my last morning before beginning the drive back to London. I went on a search for some of the rare northern prongwort mosses or *Herbertus borealis*, armed only with gps coordinates and an ordnance survey map. After a good hour hike I found them, bright bright blood red on the mountain:



Northern prongwort moss - a rare moss the entire population of which is found at Beinn Eighe.

Problems encountered and resolutions

The most significant problem I encountered were the two cancellations mentioned above. It was a real shame not to have the guidance and work experience I would have gained with the managers of Kingley Vale and Ariundle Oakwoods. However I think I made good use of my time and took a lesson in improvisation, by focusing on making my own observations and even sourcing other contacts such as the ecologist in Ariundle.

I think this trip could have been improved by either visiting one less site, or taking more time at each, as some of the visits did not feel long enough to really get my eye in.

One last problem or error on my part, was the decision to drive on rest days. Being a very new driver, I did not realise how exhausting some of the driving would be and so some of the rest days turned out to be no rest at all. On future trips I will take this into account.

Overall summary and conclusions - aims and objectives met

Overall I feel I learnt a very great amount on this trip, and met my aims and objectives. My knowledge of the native plants of the areas visited is greatly improved alongside my identification skills. I very much enjoyed the opportunity to improve my botanical photography skills, taking hundreds and hundreds of photos, only some of which are shown here. I absorbed a huge amount of information from the Ancient Tree Forum, spoke with many people about my project as well as the work I do at Kew. I learnt a lot from the organisations that funded the trip, and gained many valuable future contacts. Lastly, I gained invaluable work experience and knowledge from the nature reserves and experts I met throughout the two weeks.

There were horticultural lessons learnt, as with the mulching of the Major Oak, or aspen propagation in Beinn Eighe. I gained great aesthetic insight from the observation of these various woodland areas.

There were also great personal lessons and skills gained from the organisation and project management of such a complex trip. I feel it has been a great undertaking for me, not least because of the experience of driving to another country and back. I passed my driving test only a few weeks before departing - something which I undertook specifically for this trip but also as it represents a key skill in horticulture.

Driving to the very top of the country and back on motorways, country lanes and through hair raising scottish passing places really was a crash course in driving.

Future plans generated and recommendations for further study tours / expeditions

I now have two key plans that have stemmed from the people I met during this trip:

1. To visit the nursery for Windsor Great Park
2. Visit the community nursery used to grow the trees for the 'new' ancient woodland at Sugley Wood.

There is a lot of scope for further study here. My trip took a broad look at ancient woodland and I now think it would be interesting to hone in on more specific subjects, including:

- How invasive species have affected the habitats of the Ariundle oak woods and the entire Ardnamurchan Peninsula.
- How historic management of ancient woodlands has created the landscapes we see today.

- A look at the different horticultural and arboricultural techniques used to care for ancient oaks across the UK and the varying results.
- An exploration of the crossover between conservation and cultivation, where we have nurseries such as the one in Bedfordshire or Beinn Eighe being used to repopulate natural areas.
- Lastly I would love to investigate which existing gardens imitate or take inspiration from the UK's natural woodlands.

Final budget breakdown

Planned expenditure:

Mileage: £207.78
 Accommodation: £400
 Food / stores: £200
 ATF(120): £120
 Car service: £120
 Contingency: £109.77
Total: £1,207.55

Funding obtained:

£200 RHS
 £320 Christopher Lloyd Great Dixter
 £320 Hardy Plant Society
 £320 Merlin Trust
Total £1,160

What I actually spent:

Mileage: £322.64
 Accommodation: £479.24
 Food / stores: £200
 ATF(120): £120
 Car service: £120
Total: £1,241.88

I went over budget, specifically on mileage and accomodation, both of which turned out to be higher than estimated. I was happy to cover this myself and have learnt that Airbnb prices are higher than I thought due to the websites fees, and also that a long drive can often use more miles than predicted by Google maps.

Acknowledgments

I would like to thank the Royal Horticultural Society, Great Dixter, The Merlin Trust and the Hardy Plant Society for providing me with such generous bursaries, without which I would not have been able to make this trip.

I would like to thank Kate Crook at the Ancient Tree Forum who kindly reserved a place for me there, as well as the organisers and founders of the forum for such an excellent learning and personal experience.

I would like to thank the reserve managers, staff, and volunteers at Beinn Eighe Nature Reserve for giving me such a valuable insight into the work of this very special reserve.

Finally, I would like to thank Tony Kirkham, Ray Townsend and Martin Staniforth of the Royal Botanic Gardens, Kew for authorising and advising me on this trip.

References and bibliography

Mattheck, C and Breloer H 1993 *The Body Language of Trees: A handbook for failure analyses*, The Stationary Office, Norwich

Rackham, R 2015 *Woodlands*, paperback edn, William Collins, London

Rose, F 1981, *The Wildflower Key: How to identify wild flowers, trees and shrubs in Britain and Ireland*, New Revised expanded edn, Frederick Warne, London.

Ruth M. Tittensor, 1980 Biological Conservation 17 243-265 Ecological History of *Taxus Baccata* L. In Southern England

Web pages:

- Nature England leaflet on Kingley Vale with site map and flora and fauna examples:
<http://publications.naturalengland.org.uk/publication/32044>
- More detailed leaflet on flora and fauna at Kingley Vale with site map:
https://www.visitchichester.org/sites/default/files/51594_NE%20NNR%20Kingley%20Vale%20TAGGED_1.pdf
- Defra's NVC Field Guide to Woodland:
<http://jncc.defra.gov.uk/PDF/fieldguidetowoodland.pdf>
- Wildlife BCN leaflet on Gamblingay wood:
<https://www.wildlifebcn.org/sites/default/files/2018-05/Gamlingay%20Wood%20leaflet%202011.pdf>

- The Ancient Tree Forum:
<http://www.ancienttreeforum.co.uk/events/atf-summer-conference-2019-at-sherwood-forest/#more-6743>
- Ariundle Oakwood National Nature Reserve website: <https://www.nature.scot/reserve-plan-ariundle-oakwood-national-nature-reserve-2009-2015>
- Beinn Eighe National Nature Reserve website: <https://www.nature.scot/visit-beinn-eighe-national-nature-reserve-tadhail-beinn-eighe-tearmann-nadair-naiseanta>
- Woodland Trust UK moss id: <https://www.woodlandtrust.org.uk/blog/2018/07/types-of-moss-in-the-uk/>
- The Guardian on *Rhododendron ponticum*:
<https://www.theguardian.com/science/2017/apr/16/rhododendron-ponticum-thug-invasive-out-of-control-plantwatch>
- The RHS sudden oak death profile: <https://www.rhs.org.uk/advice/profile?PID=329> oak death
- Countryside info profile on *Rhododendron ponticum*:
<http://www.countrysideinfo.co.uk/rhododen.htm>

Appendices

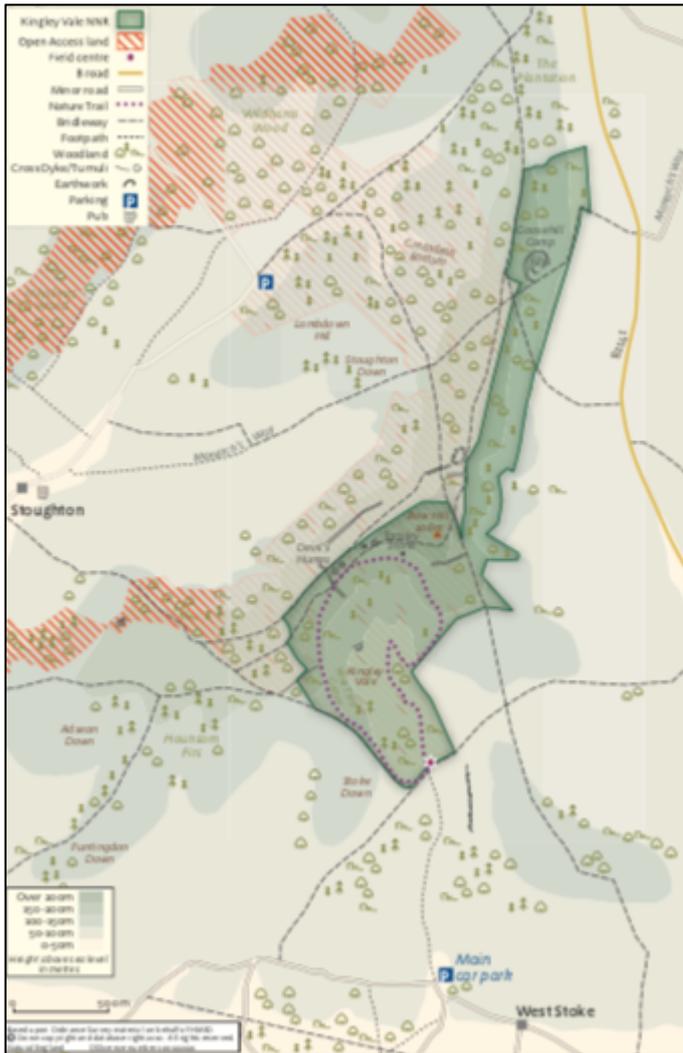
Maps:



The driving route from London to the five sites.



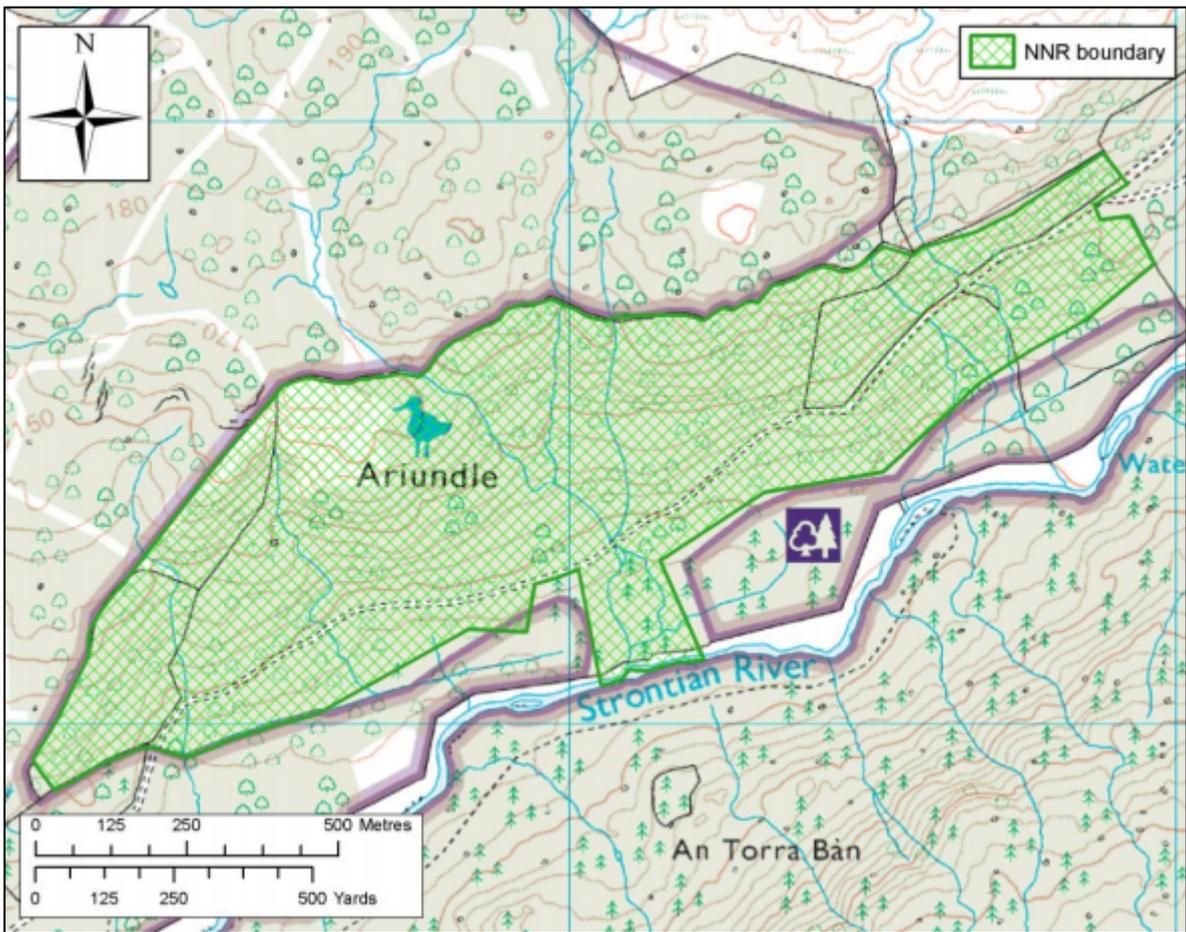
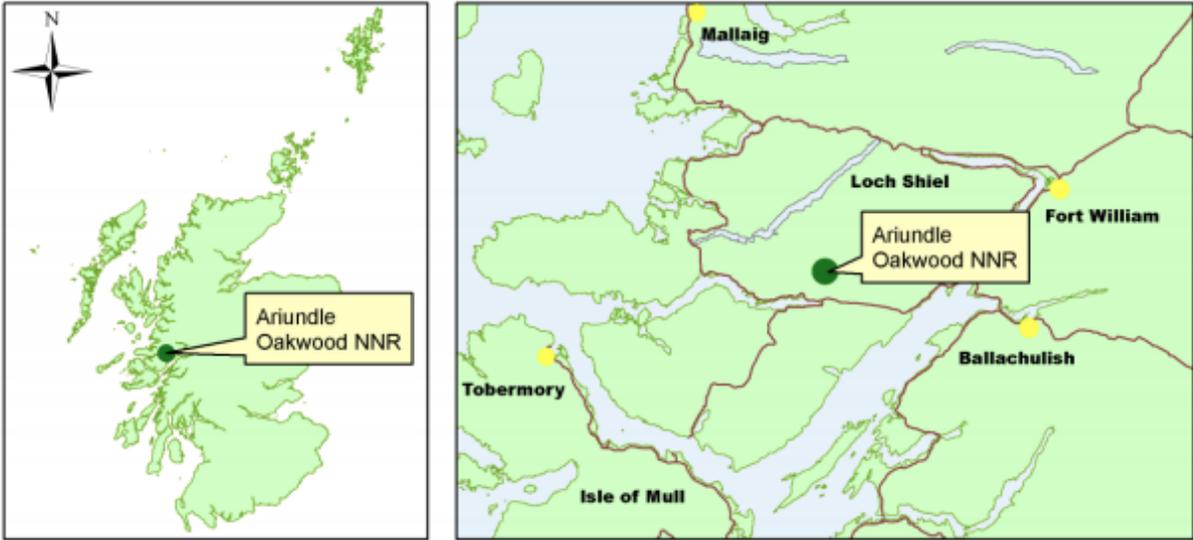
Kingley Vale NNR area map.



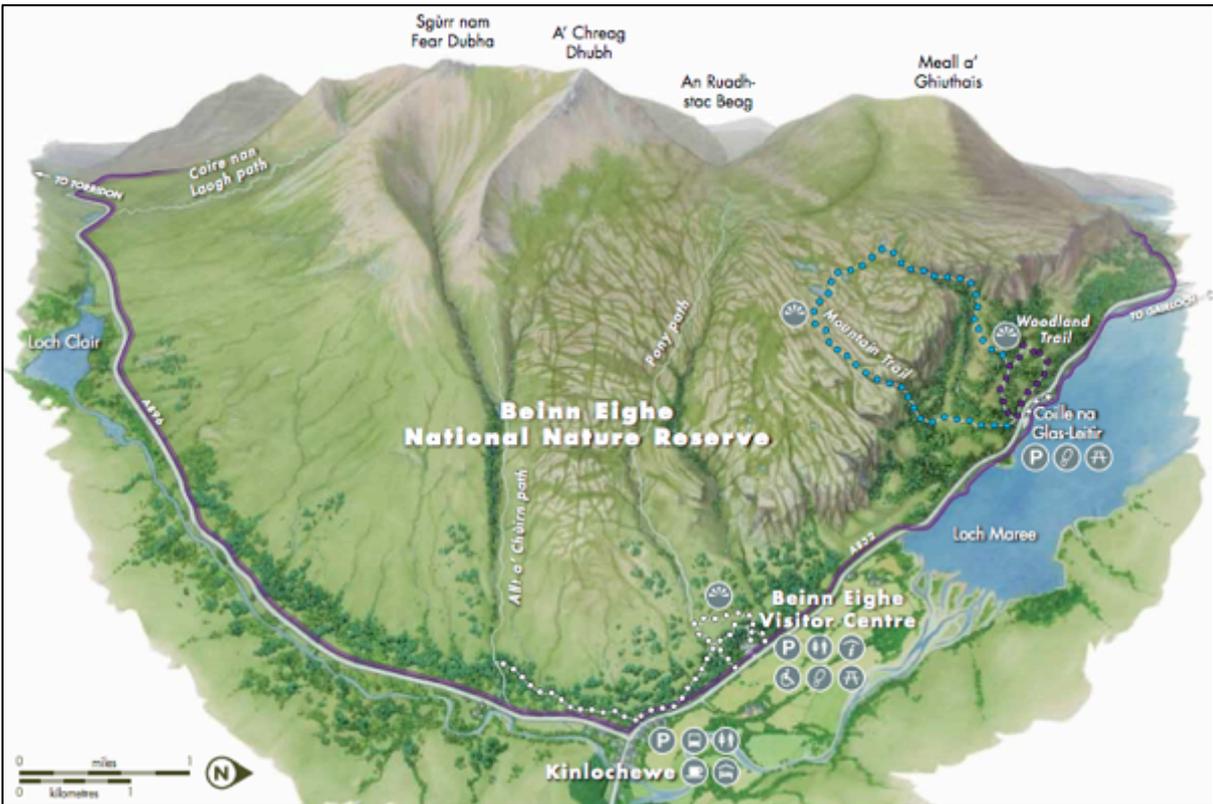
Kingley Vale site map.



Gamlingay site map.



Ariundle Oakwood site maps.



Beinn Eighe National Nature Reserve site maps.

Conference Itinerary

The Ancient Tree Forum summer forum itinerary June 2019:



Summer Forum 27 and 28 June 2019

Clumber Park Hotel, Worksop

Speaker Programme

Coffees / teas available from 8.30 on both days

Day 1	Time	Speaker	Title of talk
	09.15-09.30	Morning chair - Chris Knapman	Welcome Practicalities /arrangements for the day Introduction of speakers
	09.30-10.00	Andy Gaunt	From Ancient wood-pasture to National Nature Reserve: A journey through the Landscape History of Sherwood Forest, and the shaping of the ancient woodlands and heathlands of Birklands, Bilhaugh and the National Nature Reserve
	10.00-10.30	Charles Watkins	The management and celebration of ancient oaks at Sherwood in the eighteenth and nineteenth centuries
	10.30-10.45	Reg Harris	A postcard from the Major
	10.45-11.00	Steve Clifton	The conservation management of ancient wood-pasture at Sherwood Forest NNR during the period 2008-16
	11.00-11.45	-	Coffee break
	11.45-12.15	Luke Steer and Reg Harris	The management of veteran trees at Sherwood
	12.15-12.45	Louise Hackett and Carl Cornish	The future of Sherwood; what is sustainable wood pasture?
	12.45-13.00		Questions for speakers
	14.00-17.00	-	Visit to Sherwood RSPB Meeting point - visitor reception at Sherwood Forest. Please arrive by 2pm
	19:00		Buffet in the Courtyard
Day 2	Time	Speaker	Title of talk
	09.15-09.30	Morning chair – Tom Hill	Welcome Practicalities /arrangements for the day Introduction of speakers.
	09.30 - 10.00	Ian Leatherbarrow	Back from the Brink: Ancients of the Future Project – update
	10.00 -10.15	Keith Alexander	The saproxylic invertebrates of Sherwood Forest – an introduction
	10.15-10.30	Jo Hackman	A study of saproxylic invertebrates at Sherwood Forest using vane traps
	10.30-10.45	Ian Leatherbarrow	Cross Taxa Guidance
	10.45-11.30	-	Coffee break
	11.30-11.45	Jim Mulholland	Bats and veteran tree management
	11.45-12.15	Ted Green	Fungi first
	12.15-12.45	Russell Miller and Jim Mulholland - ATF	ATF updates, including VETcert
	12.45-13.00	-	Questions for speakers
	13.30-17.00		Visit to National Trust Clumber Park Meet opposite Clumber Park Hotel (over main road) at entrance to the park

Version 4 - June 2019