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Sustainable treescapes for everyone

Tree species selection for a changing climate -

Using what we've got

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Trees & Design Action Group

Long Term Canopy . . . The aspiration

The Reality

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What have we got?

- Our Experience and Knowledge (as individuals and collectively)
- Street Tree Inventories
- i-Tree Eco studies
- Botanical Gardens
- Other Free to Use Resources and Decision Support Tools

Experience and Knowledge

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Street Tree Inventories

Appendix II. Species Dominance Ranking List

Scientific Name	Common Name	% Population	% Leaf Area	Dominance value
Quercus robur	English oak	20.8%	31.0%	51.8
Fraxinus excelsior	Ash	16.9%	31.9%	48.8
Acer pseudoplatanus	Sycamore	10.2%	17.4%	27.6
Fagus sylvatica	Beech	8.6%	15.3%	23.9
Betula pendula	Silver birch	4.9%	12.1%	17.0
Pinus nigra	Corsican pine	3.7%	8.7%	12.4
Picea abies	Norway spruce	3.1%	8.4%	11.5
Alnus glutinosa	Alder	3.9%	6.7%	10.6
Acer campestre	Field maple	3.5%	7.0%	10.5
Tilia platyphyllos	Broad-leaved lime	4.6%	5.4%	10.0
x Hesperotropsis leylandii	Leyland cypress	1.3%	4.8%	6.1
Prunus spinosa	Blackthorn	0.7%	5.2%	5.9
Salix fragilis	Crack willow	1.9%	3.7%	5.6
Ulmus glabra	Wych elm	1.5%	3.2%	4.7
Cedrus libani	Cedar of Lebanon	1.1%	2.9%	4.0
Betula pubescens	Downy birch	1.1%	2.6%	3.7
Corylus avellana	Hazel	0.8%	1.8%	2.6
Quercus rotundifolia	Holm oak	1.0%	1.5%	2.5
Acer platanoides	Norway maple	0.7%	1.7%	2.4
Pyrus calleryana	Callery pear	0.6%	1.6%	2.2
Crataegus monogyna	Hawthorn	0.4%	1.7%	2.1
Prunus avium	Wild cherry	0.4%	1.7%	2.1
Thuja plicata	Western red cedar	0.9%	1.1%	2.0
Acer saccharinum	Silver maple	0.8%	1.1%	1.9
Ilex aquifolium	Holly	0.1%	1.6%	1.7
Pinus sylvestris	Scots pine	0.5%	1.2%	1.7
Carpinus betulus	Hornbeam	0.6%	1.1%	1.7
Malus sylvestris	Wild crab	0.4%	0.9%	1.3
Pinus radiata	Monterey pine	0.4%	0.9%	1.3
Alnus cordata	Italian alder	0.5%	0.8%	1.3
Castanea sativa	Sweet chestnut	0.5%	0.8%	1.3
Salix caprea	Goat willow	0.2%	1.0%	1.2
Populus nigra	Black poplar	0.2%	0.9%	1.1
Tilia x europaea	European lime	0.3%	0.8%	1.1
Trachycarpus fortunei	Chusan palm	0.0%	1.0%	1.0
Sequoiadendron giganteum	Giant sequoia	0.9%	<0.1%	0.9
Malus domestica	Orchard apple	0.2%	0.7%	0.9
Sambucus nigra	Elder	0.0%	0.8%	0.8
Laurus nobilis	Bay	0.1%	0.6%	0.7
Sorbus aucuparia	Rowan	0.1%	0.6%	0.7

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Street Tree Inventories

Tree condition

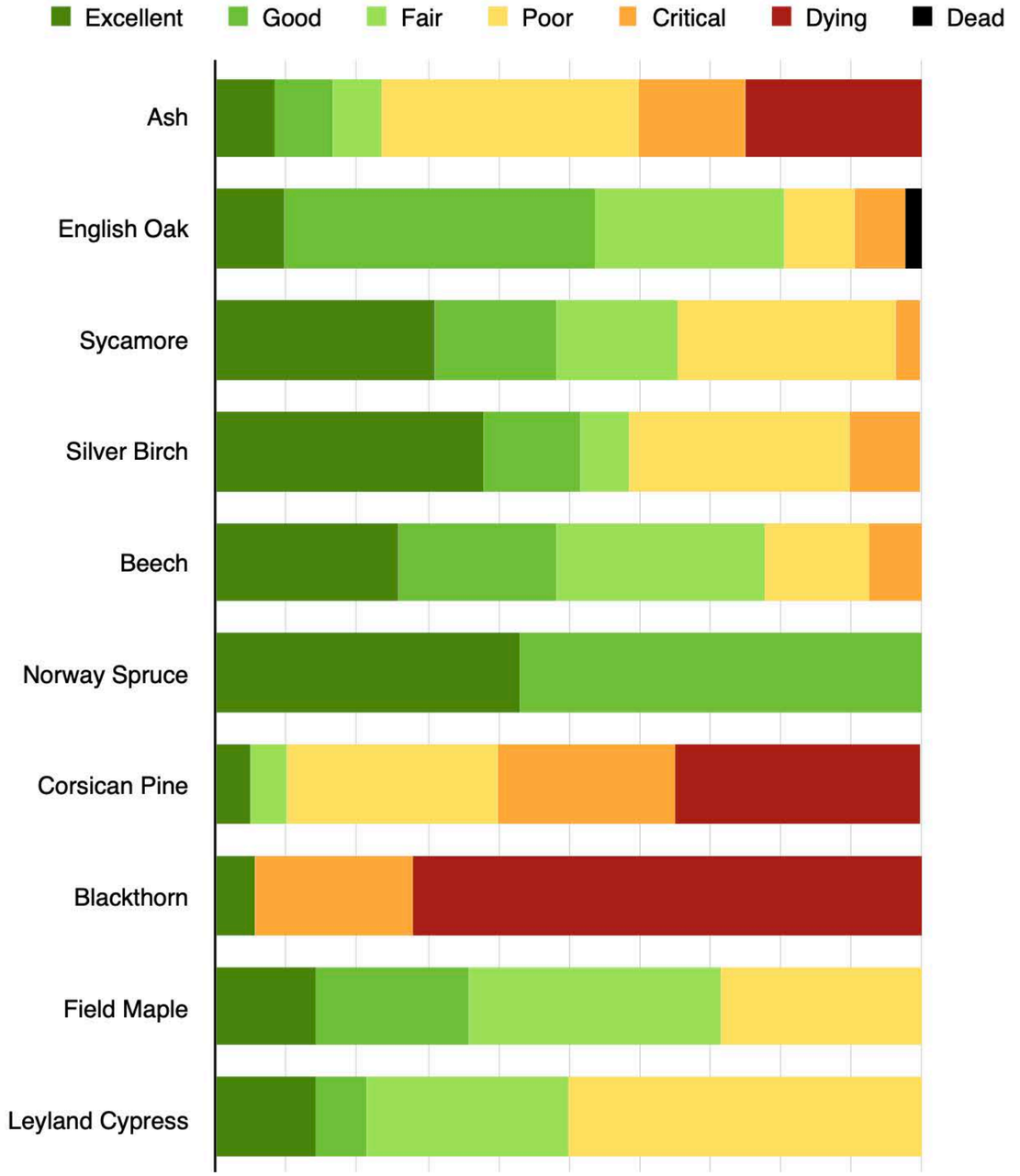
One of the most important factors when dealing with any potential pest or disease impact is to consider the health of the tree. Tree condition was measured as part of the survey and Figure 19 shows the health of the 10 most common trees in Exeter. Overall, tree health in Exeter requires improvement, with 23.8% rated as excellent condition and a further 35.6% rated good or fair. 40.6% of trees rated as poor or worse. Approximately 10% are dying or already dead.

Over 75% of Ash trees in Exeter are in a ‘poor’ condition or worse. 25% are categorised as ‘Dying’. This indicates the severity of the Ash Dieback disease in Exeter, and as Ash is the most common tree species, this is a serious concern.

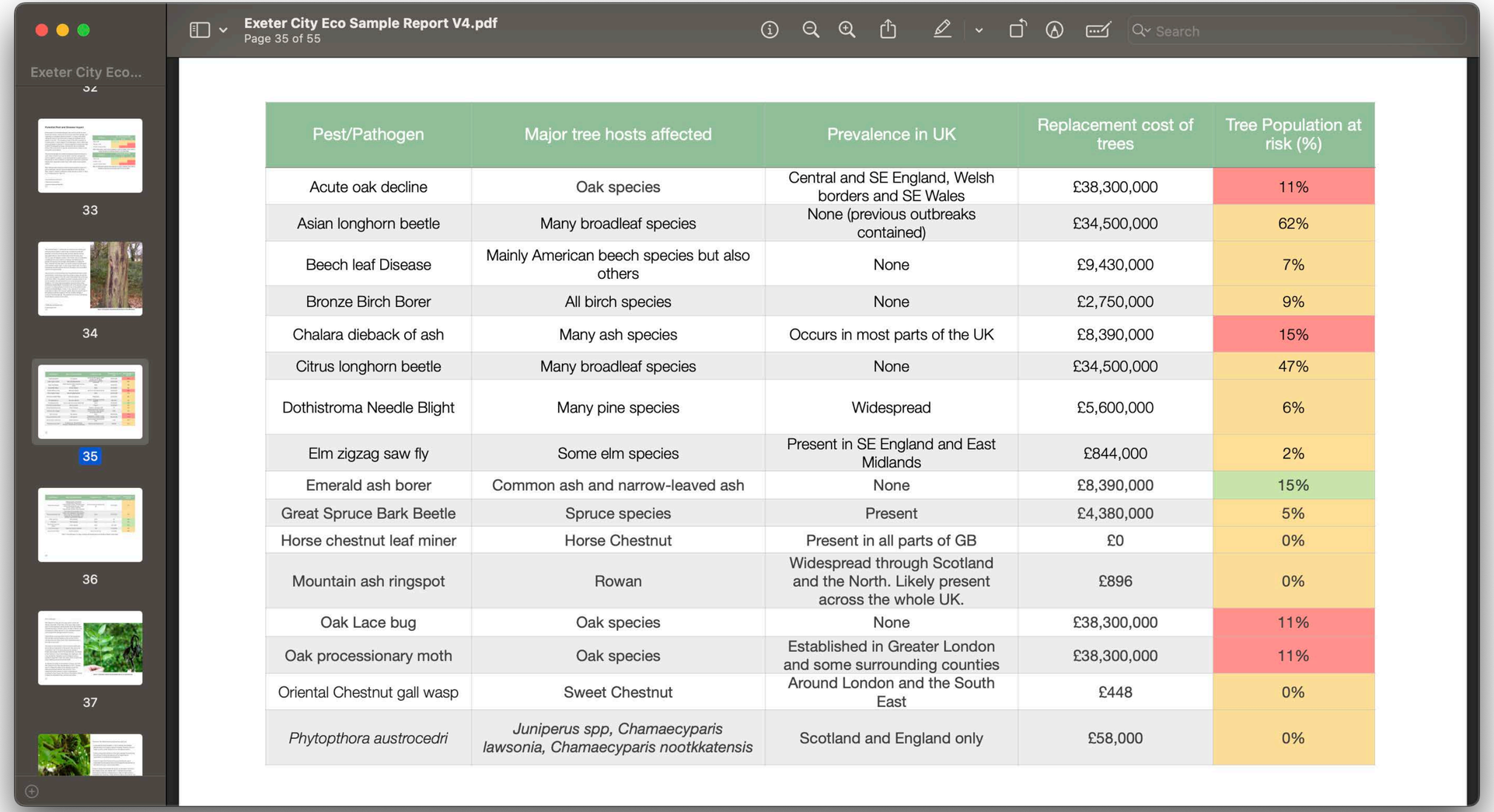
Improving the diversity of species, and particularly the evenness of species across the population will increase the resilience of the urban forest as a whole.

It will be important to tackle Ash Dieback and prepare to replace the trees which will inevitably be lost. Selecting species which are suitable replacements for Ash is key to replacing the lost canopy cover and replacement species should have roughly the same potential for ecosystem service provision as those which are lost.

Blackthorn and Corsican Pine also have serious concerns regarding the proportion their population which can be considered critical or worse.



Street Tree Inventories



Pest/Pathogen	Major tree hosts affected	Prevalence in UK	Replacement cost of trees	Tree Population at risk (%)
Acute oak decline	Oak species	Central and SE England, Welsh borders and SE Wales	£38,300,000	11%
Asian longhorn beetle	Many broadleaf species	None (previous outbreaks contained)	£34,500,000	62%
Beech leaf Disease	Mainly American beech species but also others	None	£9,430,000	7%
Bronze Birch Borer	All birch species	None	£2,750,000	9%
Chalara dieback of ash	Many ash species	Occurs in most parts of the UK	£8,390,000	15%
Citrus longhorn beetle	Many broadleaf species	None	£34,500,000	47%
Dothistroma Needle Blight	Many pine species	Widespread	£5,600,000	6%
Elm zigzag saw fly	Some elm species	Present in SE England and East Midlands	£844,000	2%
Emerald ash borer	Common ash and narrow-leaved ash	None	£8,390,000	15%
Great Spruce Bark Beetle	Spruce species	Present	£4,380,000	5%
Horse chestnut leaf miner	Horse Chestnut	Present in all parts of GB	£0	0%
Mountain ash ringspot	Rowan	Widespread through Scotland and the North. Likely present across the whole UK.	£896	0%
Oak Lace bug	Oak species	None	£38,300,000	11%
Oak processionary moth	Oak species	Established in Greater London and some surrounding counties	£38,300,000	11%
Oriental Chestnut gall wasp	Sweet Chestnut	Around London and the South East	£448	0%
Phytopthora austrocedri	*Juniperus spp, Chamaecyparis lawsonia, Chamaecyparis nootkkatensis*	Scotland and England only	£58,000	0%

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Street Tree Inventories

5. Current Species Suitability

Species suitability refers to a species ability to survive in certain conditions such as differing climate and soils. In urban spaces, it also includes tolerances to urban pressures, such as pollution levels, high salinity, reduced access to light, water and more. Belfast has an exceptionally wet climate compared to the rest of the UK. It also experiences more storm events accompanied by high winds.

The Climate Assessment Tool (CAT) asserts the likely suitability of taxa to predicted future climate scenarios - informing which of these species will be most vulnerable, and best suited to these anticipated changes in climate. Species were analysed under RCP 4.5 by 2050, and RCP 7.0 by 2090. By comparing 3 climates, a suitability score can be generated, determining how likely the species is to occur at the mean annual temperature for each selected pathway. A list of street tree species and their suitability according to the CAT is in Appendix III.

Of particular note, *Pinus sylvestris* and *Cuprocyparis x leylandii* are the least suited to current and expected 2050 conditions, and *Larix decidua* and *Pinus sylvestris* are the least well suited to potential 2090 conditions in Belfast. *Acer pseudoplatanus* and *Chamaecyparis lawsonia* are the most well suited to current and future conditions.

Scientific Name	Current Suitability	2050 Suitability	2090 Suitability
Fraxinus excelcior			
Acer pseudoplatanus			
Fagus sylvatica			
Prunus avium			
Quercus robur			
Larix decidua			
Pinus sylvestris			
Chamaecyparis lawsonia			
Crataegus monogyna			
Cuprocyparis x leylandii			
Tilia × europaea			
Tilia cordata			
Acer platanoides			
Crataegus crus-galli			
Populus nigra			
Quercus palustris			
Cedrus atlantica			
Tilia ×euchlora			
Prunus padus			
Ulmus glabra			

Table 3: Potential suitability of the to 10 most common trees of the total existing population (top), the 3 most common street tree species (middle), and some other street tree species for consideration (bottom) in 2050 and 2090 .

i-Tree Eco Studies

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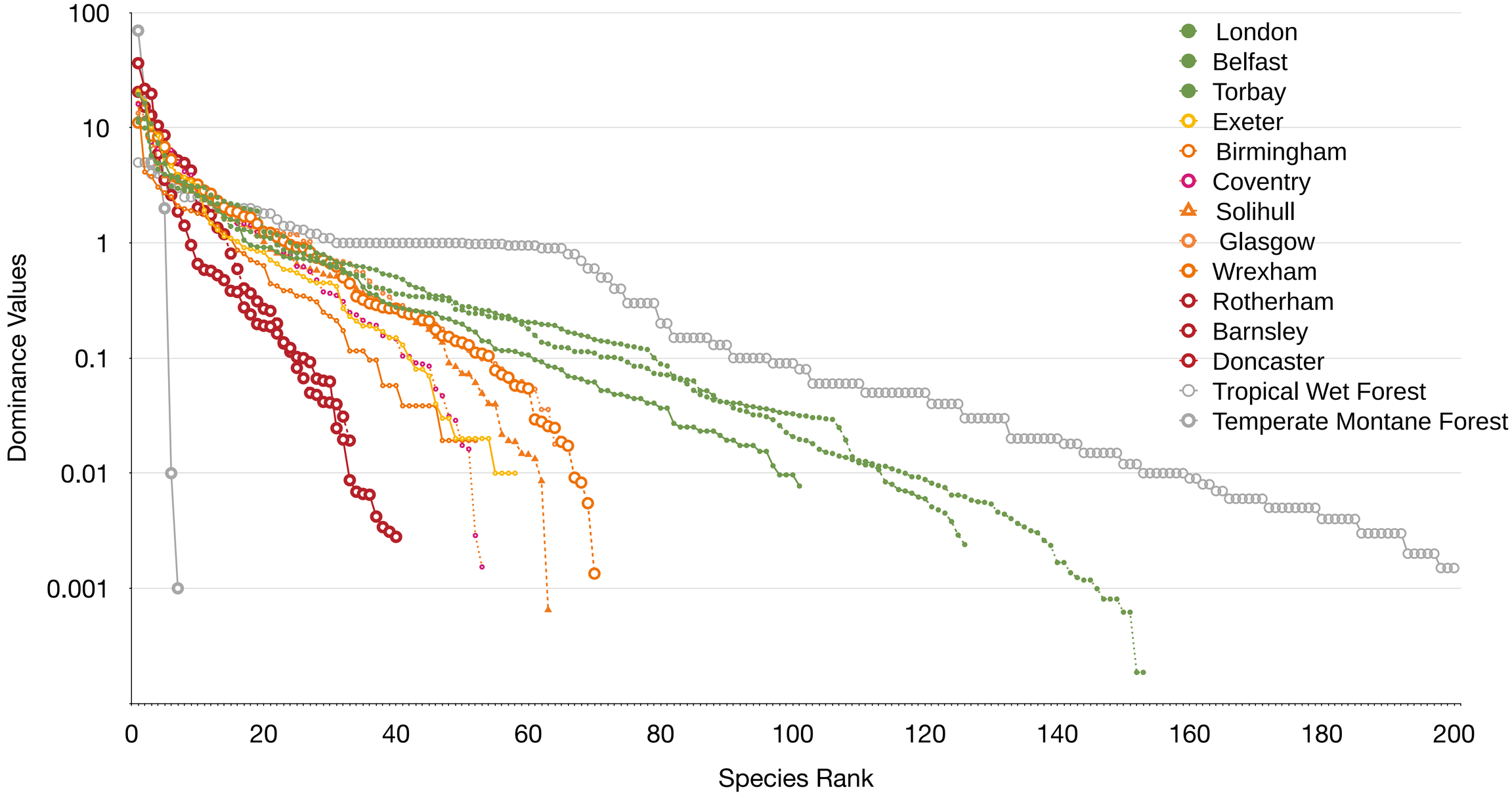

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Botanical Gardens

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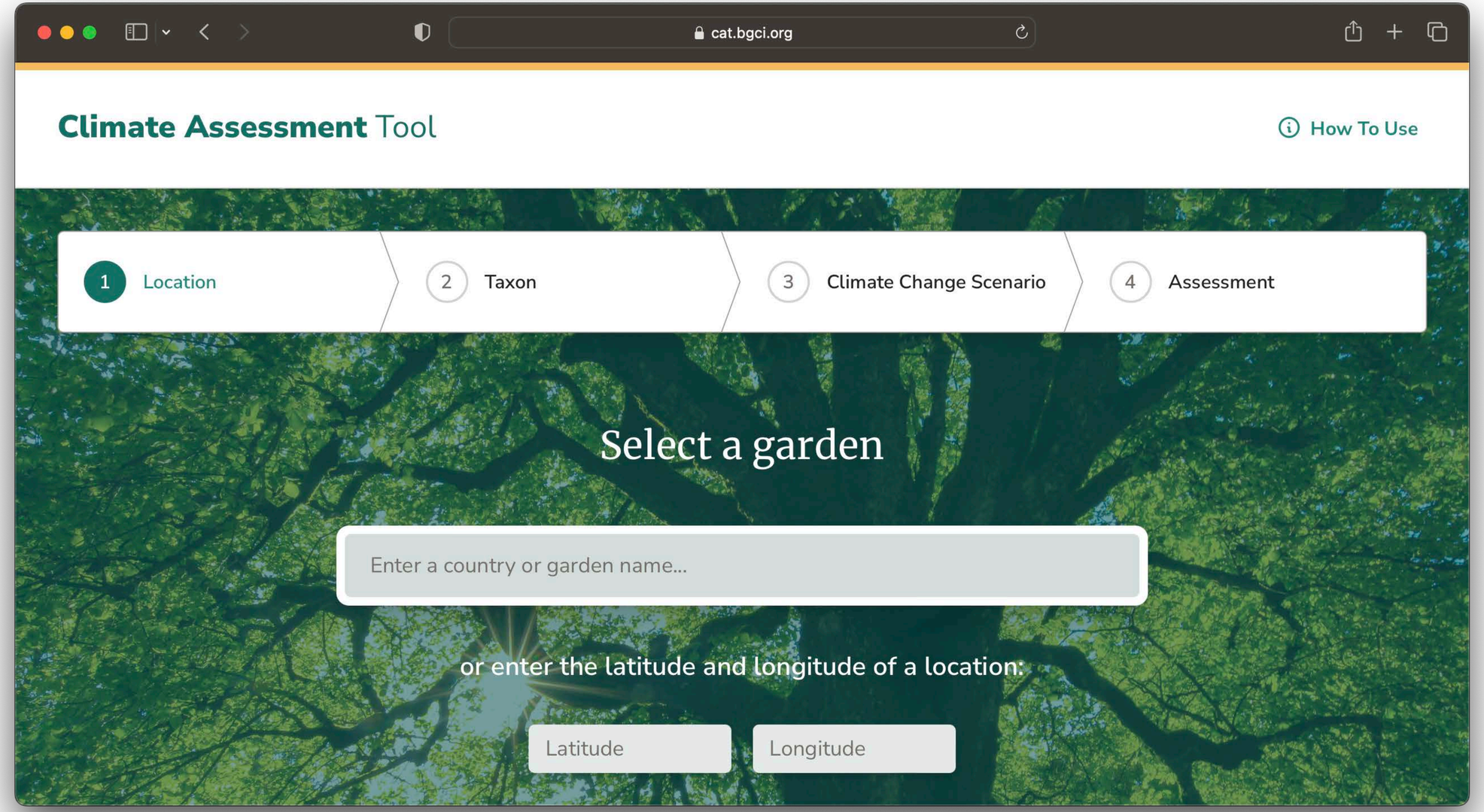

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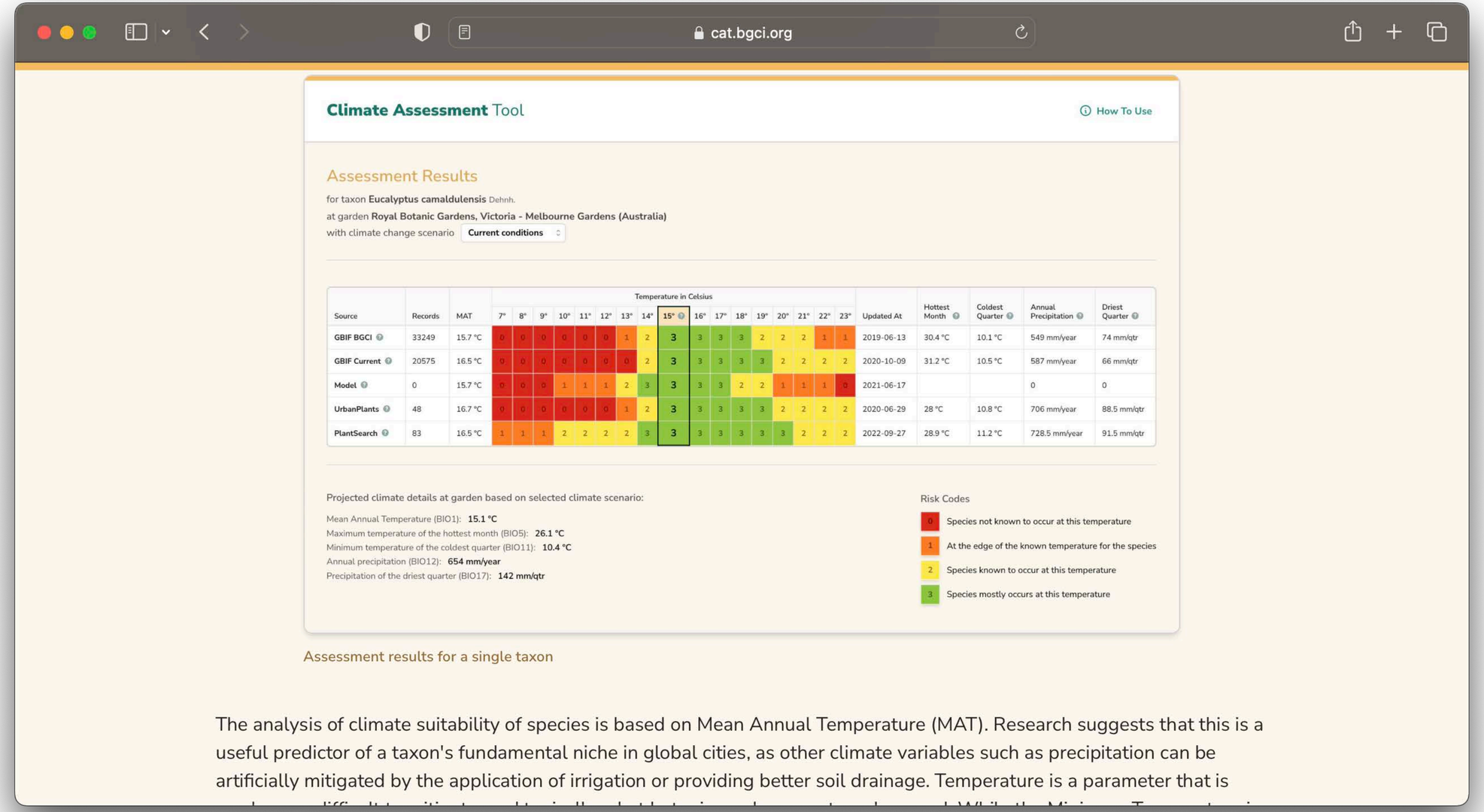
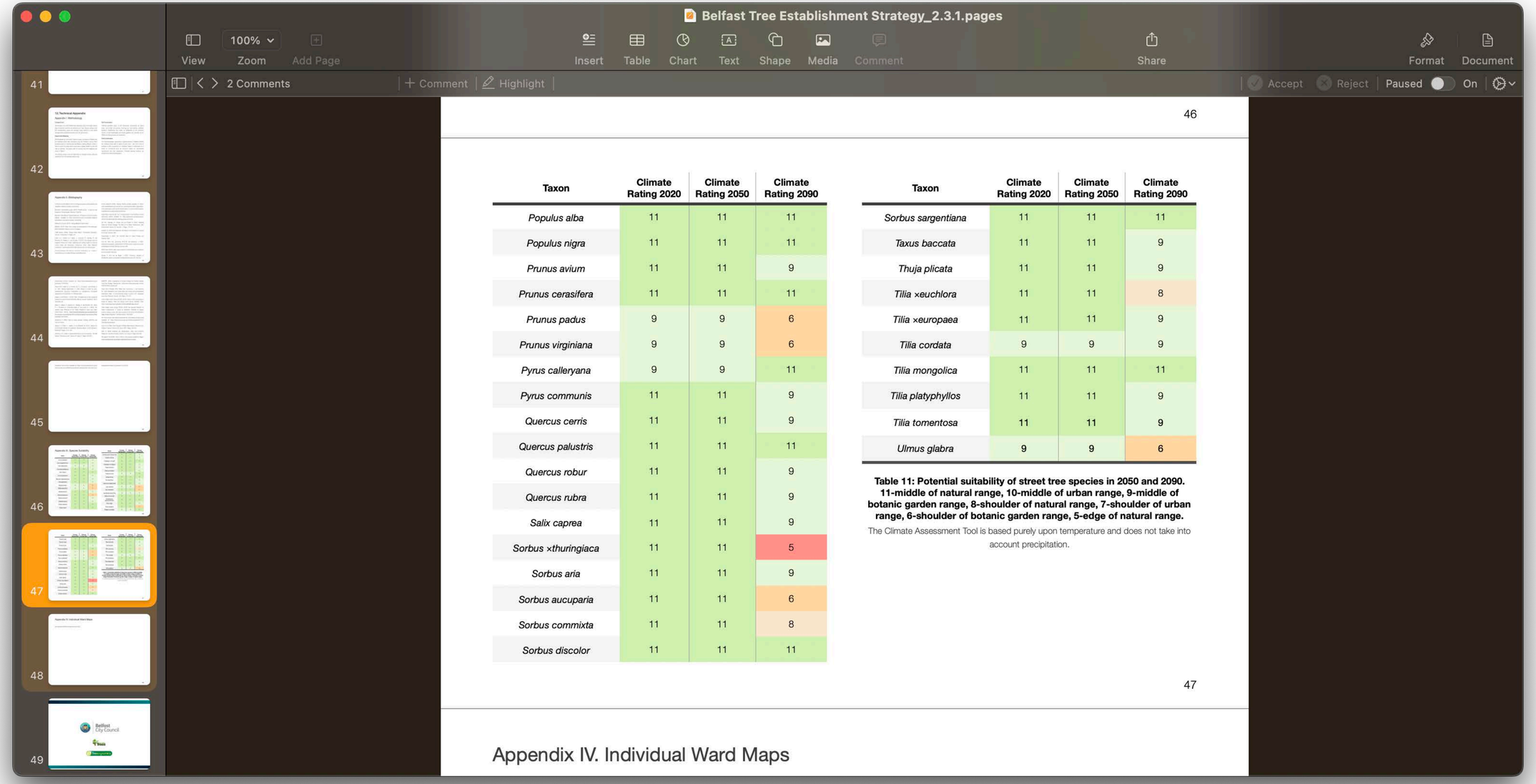


Assessment results for a single taxon

The analysis of climate suitability of species is based on Mean Annual Temperature (MAT). Research suggests that this is a useful predictor of a taxon's fundamental niche in global cities, as other climate variables such as precipitation can be artificially mitigated by the application of irrigation or providing better soil drainage. Temperature is a parameter that is

Free to Use Resources



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Join us at the 4th European Urban Releaf and i-Tree Conference in Dundee, Scotland

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i-Tree and Beyond – Turning data into action in and around the Urban Forest

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Thank You

Any Questions ?