URBAN NATURE

University of Salford
A Greater Manchester University

The Resilience of Urban Trees

N. J. Wallbank and P. James

Urban Trees

Climate regulation

Aesthetics

Habitats

Recreation

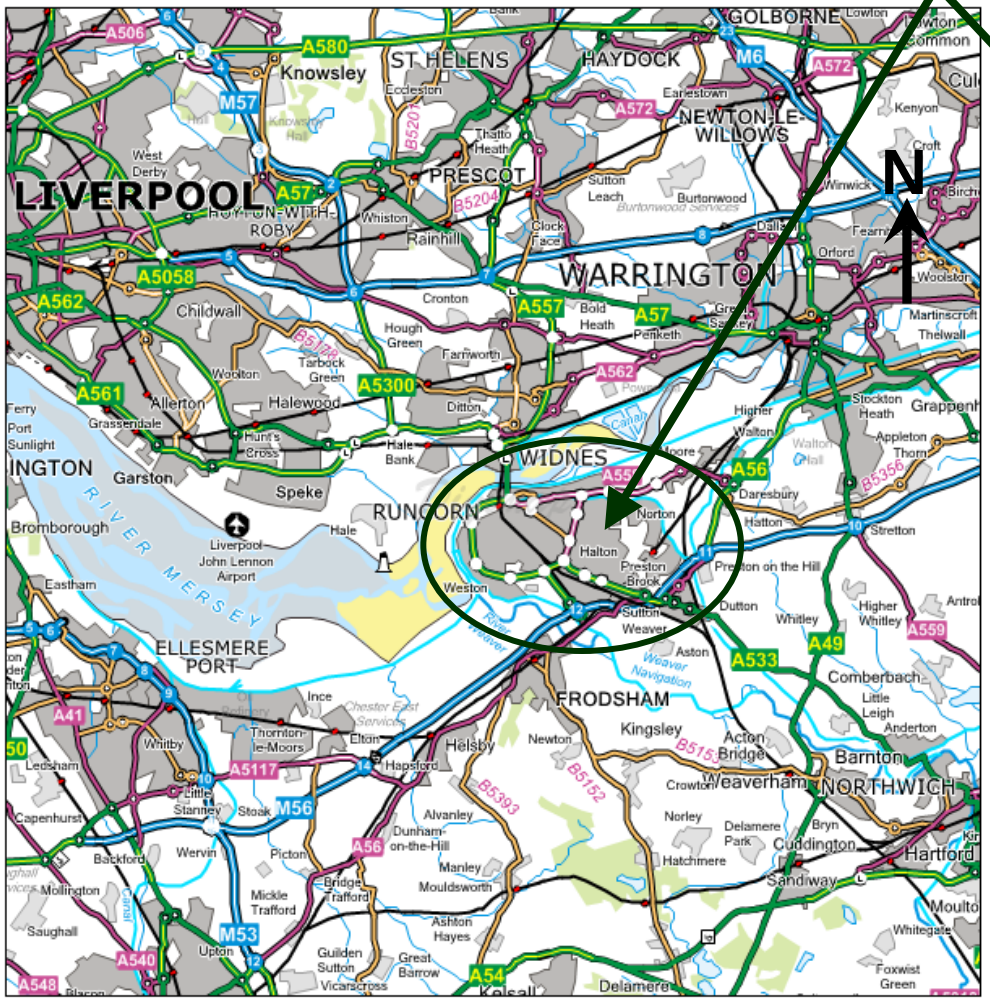
Water regulation

Future?

Resilience

“the speed and completeness of the subsequent return to control levels”
Grime, 2001

Runcorn



Why Runcorn?

- **Large number of Trees**
- **Integral Part of the Town**
- **Mature**

Climate Change

Time	Mean Winter Temp (˚C)	Mean Summer Temp (˚C)	Mean Winter Rainfall (%)	Mean Summer Rainfall (%)
2020s	+ 0.3 / + 2	+ 0.6 / + 2.5	- 4 / + 14	- 23 / + 10
2050s	+ 0.8 / + 3.3	+ 1.1 / + 4.7	- 1 / + 27	- 37 / + 8
2080s	+ 1.3 / + 4.8	+ 1.3 / + 7.3	+ 3 / + 50	- 51 / + 3

Ranges from the lowest to highest value of change for all emission scenarios and all three (10, 50, and 90%) probability levels for each 30-year time period from UKCIP09.

Predicting Resilience

- **Historical perspective**
- **Higher in species-rich communities**

Historical perspective

2050 Summer mean temperature central estimate, High emissions 18.65 ºC

Summer mean precipitation High emissions 134.9mm

1976 15.79 ºC & 91.5mm

1995 15.88 ºC & 126.8mm

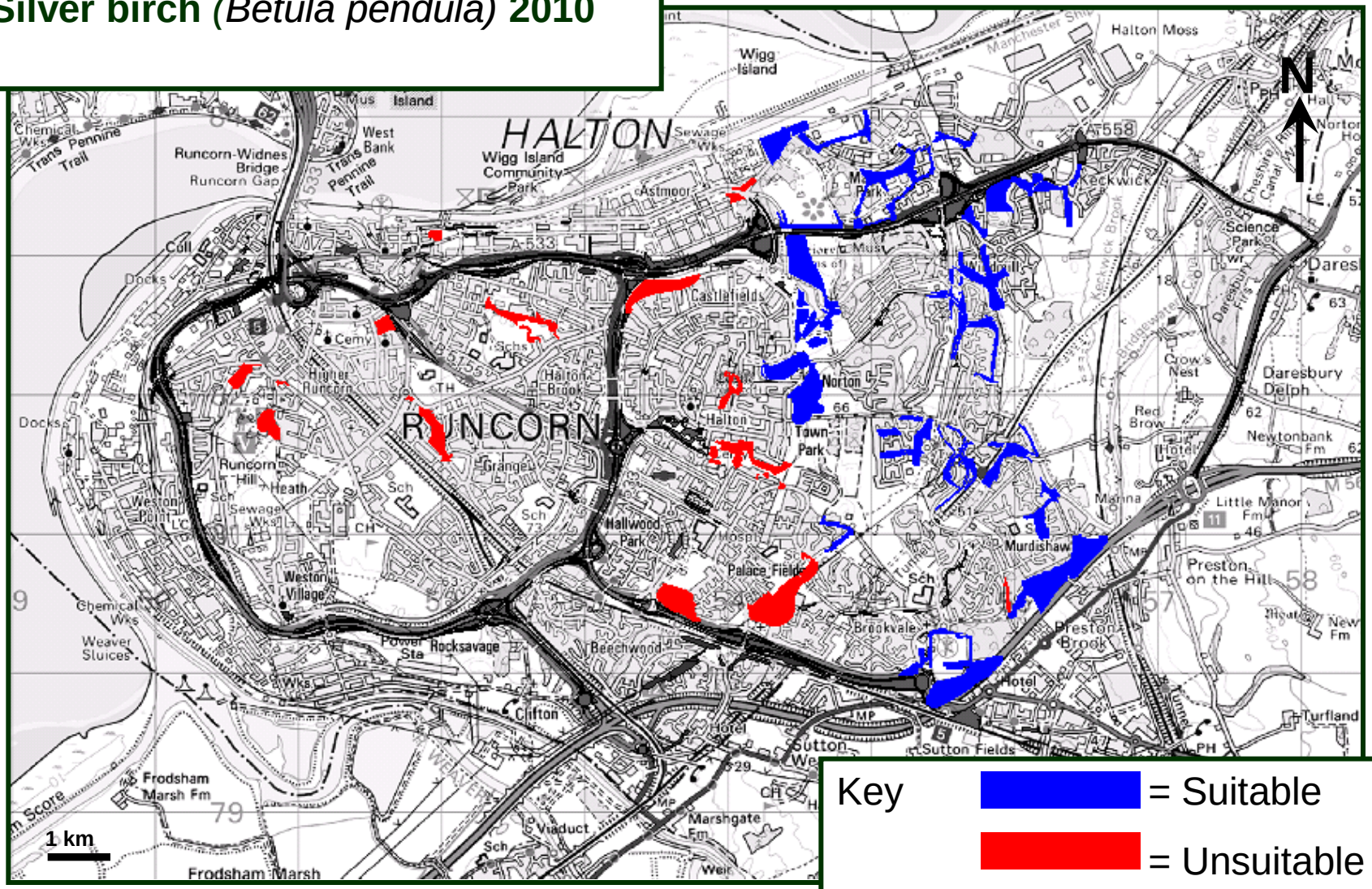
Tree Composition

27 Tree species have been recorded in Runcorn's Vegetation framework

Traits	Number of Species
Drought resistant	9
Windfirm	19
Tolerates flooding	7
Frost resistant	21

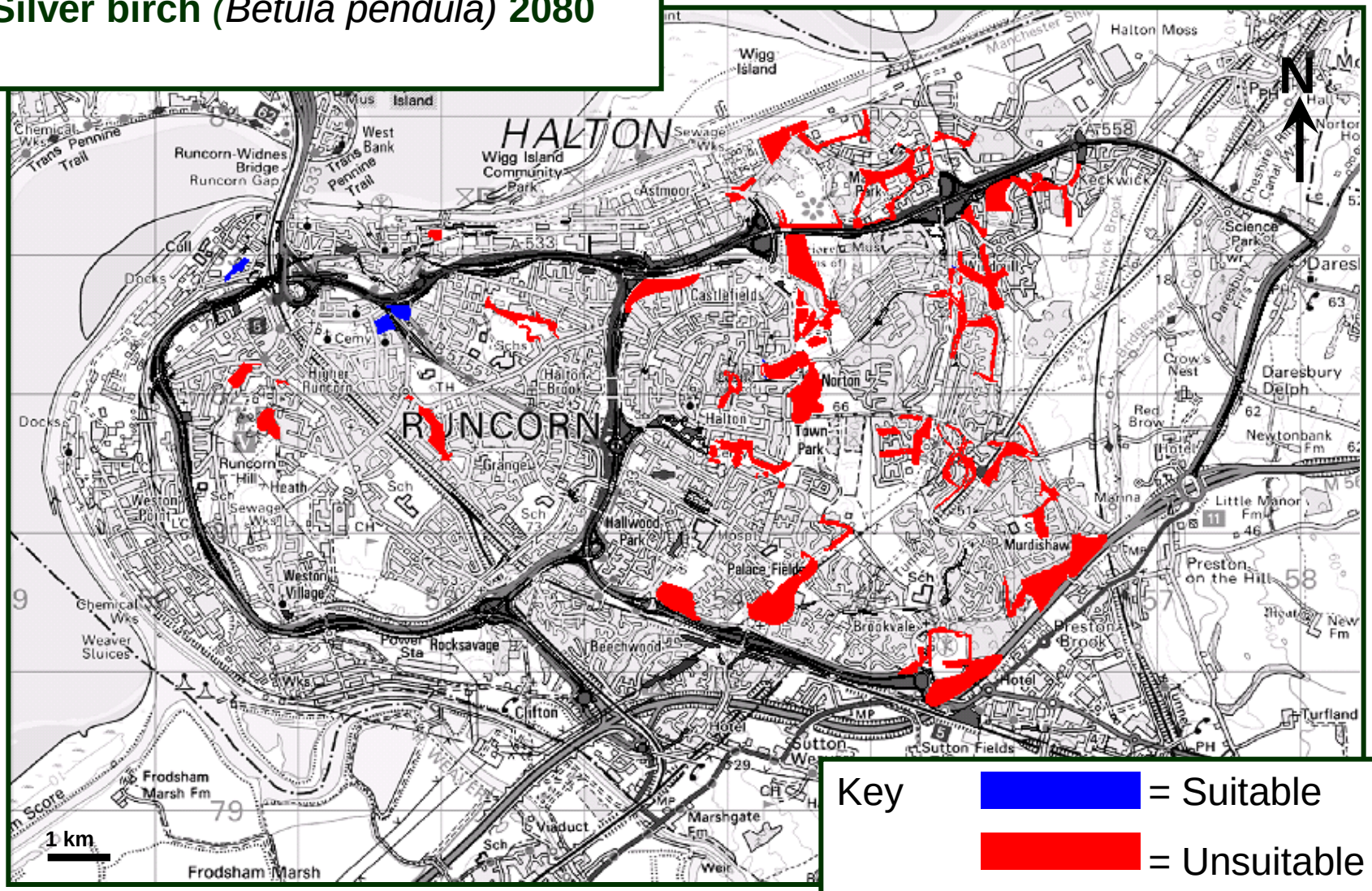
Suitability Maps

Silver birch *(Betula pendula)* **2010**



Suitability Maps

Silver birch *(Betula pendula)* **2080**



ESC Results

Species	Suitable area at present (hectares)	Suitable area from 2050-2080 (hectares)	Percentage loss / gain (%)
Silver birch (*Betula pendula*)	28	5	- 81
Beech (*Fagus sylvatica*)	14	3	- 79
Alder (*Alnus glutinosa*)	14	5	- 64
Oak (*Quercus robur*)	14	5	- 64
Poplar (*Populus* sp.)	14	5	- 64
Wild cherry (*Prunus avium*)	14	5	- 63
Scots pine (*Pinus sylvestris*)	50	50	0
Sycamore (*Acer pseudoplatanus*)	50	50	0
Ash *(Fraxinus excelsior)*	39	50	+ 22
Land area within vegetative framework that is considered suitable for each species			

Impacts

•**Alder** (*Alnus glutinosa*)**, Oak** (*Quercus robur*)**, Poplar** (*Populus* sp.)**, Wild cherry** (*Prunus avium*)**, Silver birch** (*Betula pendula*) **and Beech** (*Fagus sylvatica*) **make up <u>40%</u> of the tree cover in the framework**

Species	Insects	Lichens
Oak (*Quercus robur*)	284	324
Silver birch (*Betula pendula*)	229	126
Alder (*Alnus glutinosa*)	90	105
Beech (*Fagus sylvatica*)	64	206
Ash *(Fraxinus excelsior)*	41	255
Sycamore (*Acer pseudoplatanus*)	15	183

Southwood (1961) and Rose and harding (1978)

Conclusion

- **Only a small number of trees present in Runcorn possess traits to cope with all climatic circumstances**

- **40% of the tree cover in Runcorn's vegetation framework is going to suffer with projected climate change according to ESC**

- **Runcorn's tree network is likely to lose the ecosystem services is currently provides**

Future Work

- **Analysis of management practices**
- **Measurement of ecosystem services**
- **Future management strategies for this landscaping to *circa* 2060**

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Urban Nature website:
http://www.els.salford.ac.uk/urbannature

References:

Grime,J. P. 2001 Plant strategies, vegetation processes, and ecosystem properties/ 2nd ed. John Wiley & Sons, ltd.

Rose F. and Harding, P.T. (1978) Pasture and woodlands in Lowland Britain and their importance for the conservation of the epiphytes and invertebrates associated with old trees. Nature Conservancy Council & The Institute of Terrestrial Ecology.

Southwood, T.R.E. (1961) The numbers of species of insect associated with various trees. *J. Animal Ecology* **30**: 1-8