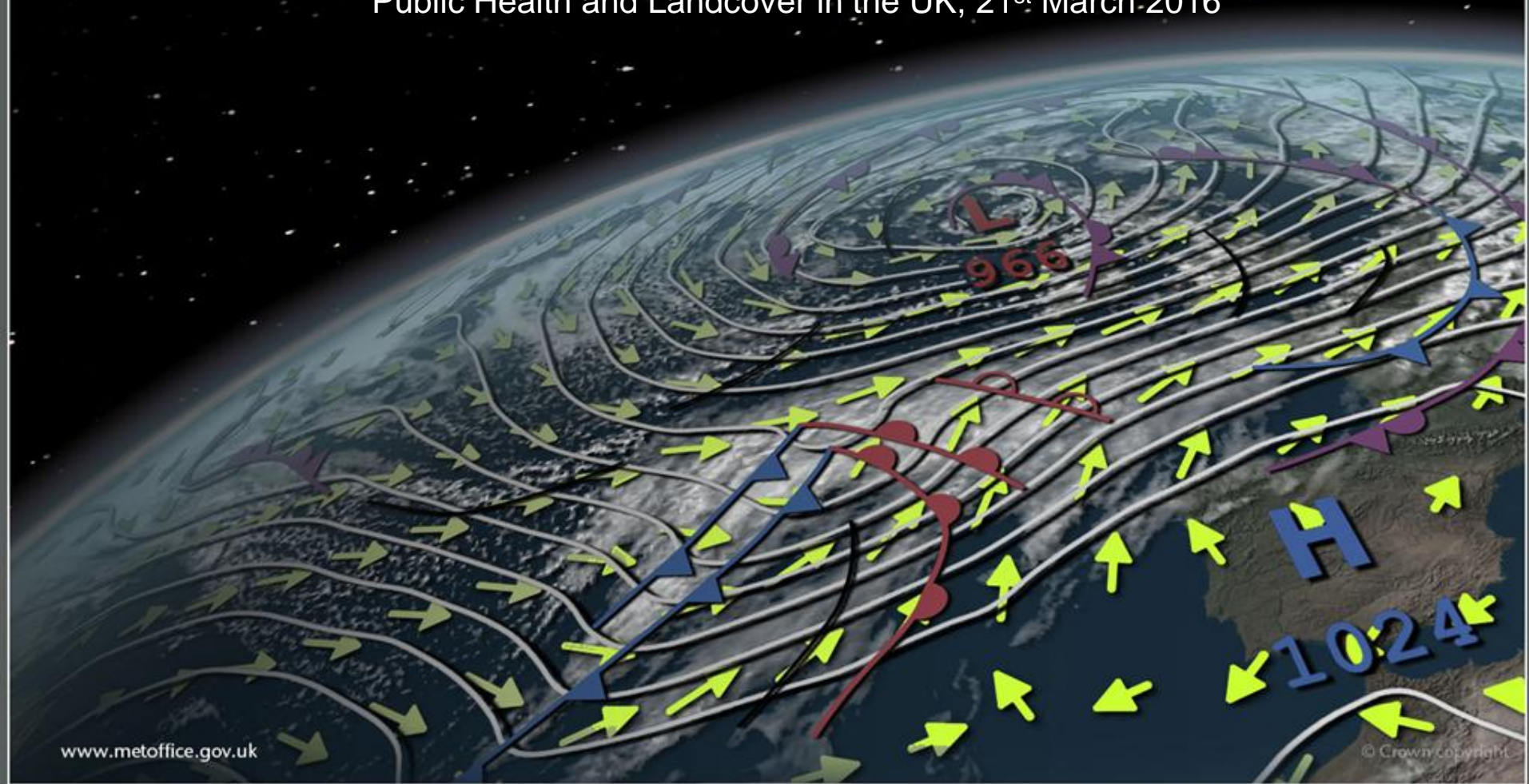# Mapping Vegetation to Assess Allergen Exposures

Rachel McInnes & Debbie Hemming

Public Health and Landcover in the UK, 21st March 2016

© Crown copyright

Mapping Vegetation to Assess Allergen Exposures

Table of Contents

Rachel.McInnes@metoffice.gov.uk

Health Protection Research Unit in Environmental Change

Public Health and the Natural Environment

Collaborators:

Ian Alcock, Sani Dimitroulopoulou, Bernd Eggen, Lora Fleming, Shakoor Hajat, Deborah Hemming, Sari Kovats, Rachel McInnes, Nicholas Osborne, Sotiris Vardoulakis, Ben Wheeler

Rachel.McInnes@metoffice.gov.uk

Allergenic pollen

Health Protection Research Unit in Environmental Change

Health impact

- ❖ affects ~20% of population
- ❖ hayfever
- ❖ asthma
- ❖ rise in respiratory hospital admissions

Climate interactions

Readiness to flower:
- ❖ water availability
- ❖ habitat availability
- ❖ temperature

Pollen release:
- ❖ irradiation, humidity

Pollen spread:
- ❖ rainfall
- ❖ wind direction/strength

Rachel.McInnes@metoffice.gov.uk

Vegetation Mapping

Species mapping

❖ **Combined datasets** (LCM2007, Bluesky National Tree Map, Forestry Commission, Trees in Towns II)

❖ **Calculate 'habitat suitability' for weed species**

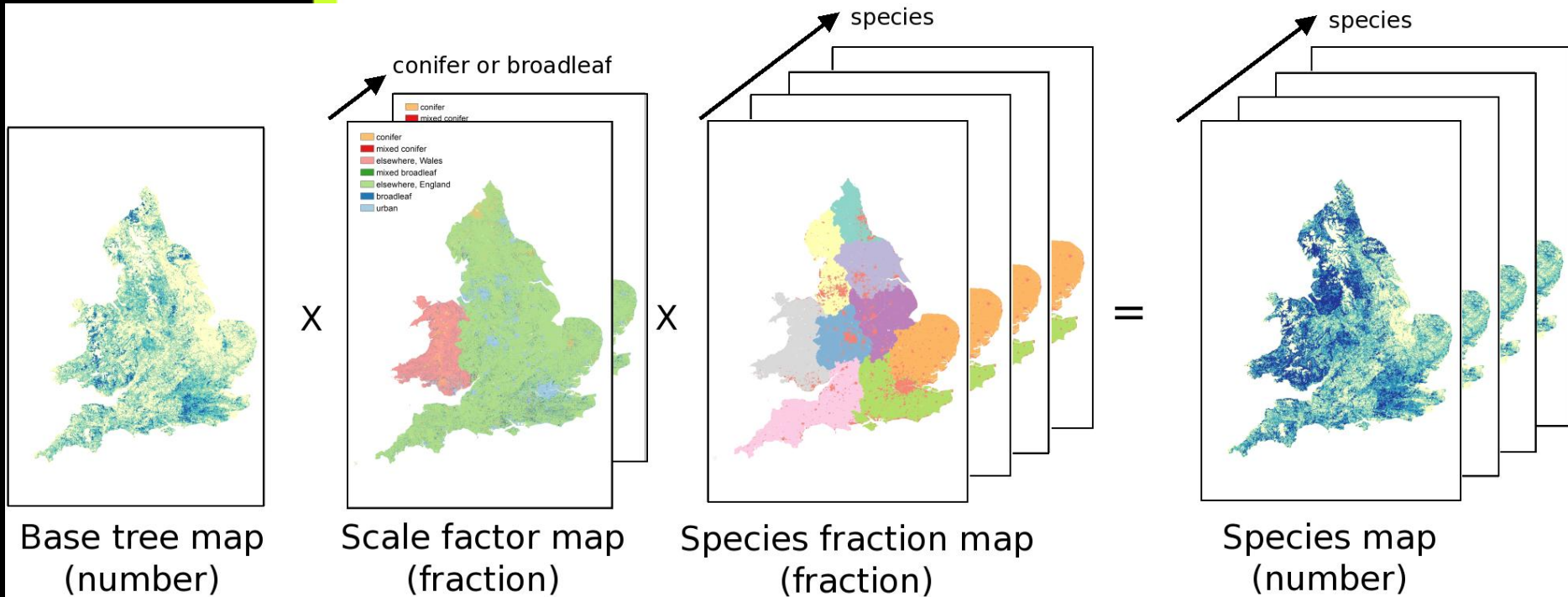❖ **Produced maps of species locations – 1km & 25m resolution, GB coverage**

Allergenic species

❖ **Trees** (alder, ash, birch, hazel, oak, pine, willow)

❖ **Grass** (all species of *Poaceae*)

❖ **Weeds** (dock, mugwort, nettle, plantain, ragweed)

Rachel.McInnes@metoffice.gov.uk

Tree Mapping Method

Base tree map (number)   X   Scale factor map (fraction)   X   Species fraction map (fraction)   =   Species map (number)

Rachel.McInnes@metoffice.gov.uk

Tree Map Results

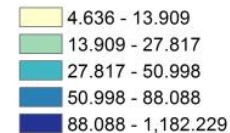Quantile colourbars

Units – number of trees in 1km x 1km grid box

Alder

- 3.096 - 9.287
- 9.287 - 21.670
- 21.670 - 37.149
- 37.149 - 65.0114
- 65.0114 - 789.424

Willow

- 4.636 - 13.909
- 13.909 - 27.817
- 27.817 - 50.998
- 50.998 - 88.088
- 88.088 - 1,182.229

Oak

- 6.562 - 32.808
- 32.808 - 59.054
- 59.054 - 98.424
- 98.424 - 170.601
- 170.601 - 1,673.201

Ash

- 7.304 - 29.214
- 29.214 - 58.428
- 58.428 - 102.250
- 102.250 - 175.285
- 175.285 - 1,862.406

Rachel.McInnes@metoffice.gov.uk

Tree Map Results

Quantile colourbars

Units – number of trees in 1km x 1km grid box

Birch

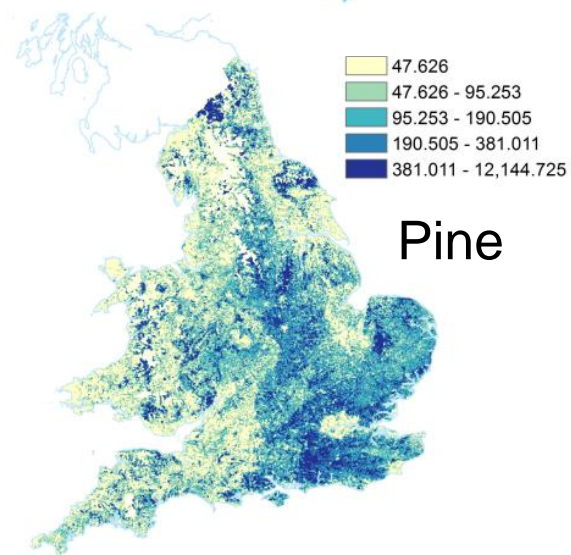|	
	9.809 - 29.426
	29.426 - 58.852
	58.852 - 107.896
	107.896 - 205.983
	205.983 - 2,501.227

Hazel

	14.573 - 43.720
	43.720 - 87.440
	87.440 - 160.306
	160.306 - 320.613
	320.613 - 3,716.190

Pine

	47.626
	47.626 - 95.253
	95.253 - 190.505
	190.505 - 381.011
	381.011 - 12,144.725
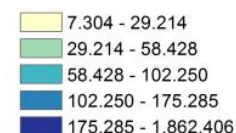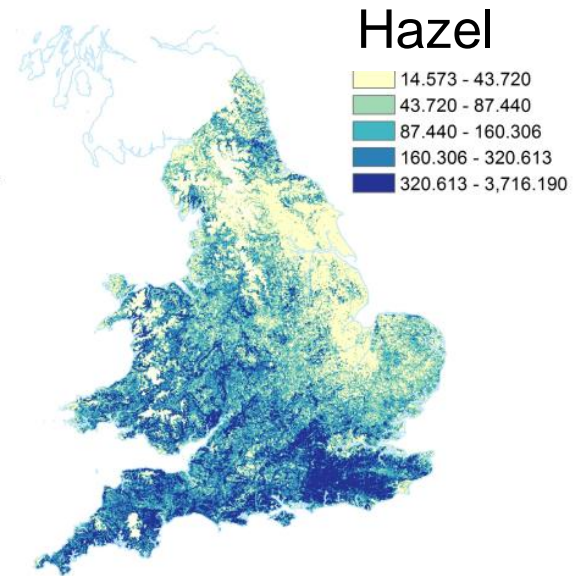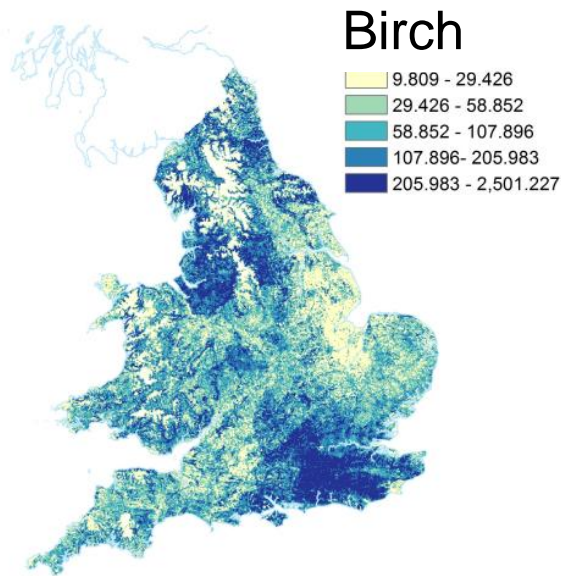
Weed Map Results

Quantile colourbars

Units – % cover in 1km x 1km grid box

Dock

0.008 - 0.627
0.627 - 0.957
0.957 - 1.004
1.004 - 1.106
1.106 - 2.0

Nettle

0.004 - 0.055
0.055 - 0.110
0.11 - 0.153
0.153 - 0.196
0.196 - 1.0

Mugwort

0.0004 - 0.035
0.035 - 0.051
0.051 - 0.060
0.060 - 0.069
0.069 - 1.0

Ragweed

0.0002 - 0.0004
0.0004 - 0.0012
0.0012 - 0.0037
0.0037 - 0.0157
0.0157 - 0.05

Plantain

0.018 - 0.091
0.091 - 0.219
0.219 - 0.4020
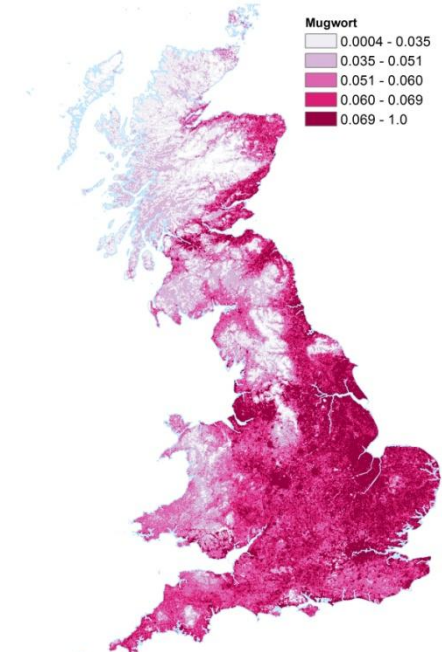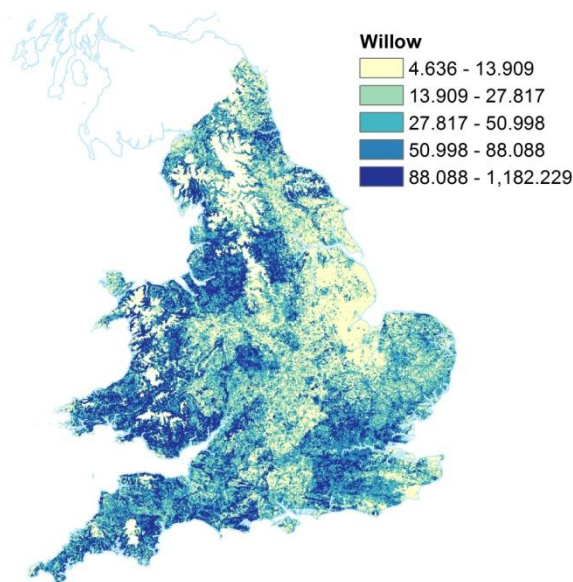0.402 - 0.731
0.731 - 4.658

www.metoffice.gov.uk

Rachel.McInnes@metoffice.gov.uk
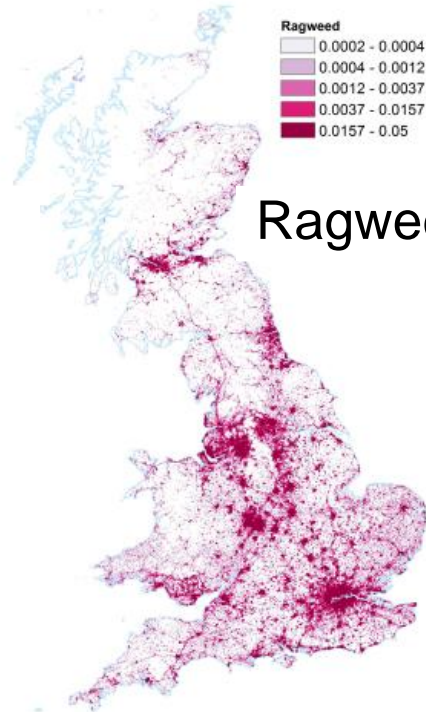
Discussion

• Maps of vegetation location – not pollen in air or human exposure

• Pollen timing & release is complex – many meteorological & environmental factors

• Effect of climate change highly uncertain

Willow
- 4.636 - 13.909
- 13.909 - 27.817
- 27.817 - 50.998
- 50.998 - 88.088
- 88.088 - 1,182.229

Mugwort
- 0.0004 - 0.035
- 0.035 - 0.051
- 0.051 - 0.060
- 0.060 - 0.069
- 0.069 - 1.0

© Crown copyright

Rachel.McInnes@metoffice.gov.uk

Next steps…

- Health impacts studies
  - Comparison of vegetation maps to hospital admissions data
    - (ECEHH Exeter Uni, Public Health England)

- Self-management of allergy

- Vegetation management practices

Rachel.McInnes@metoffice.gov.uk
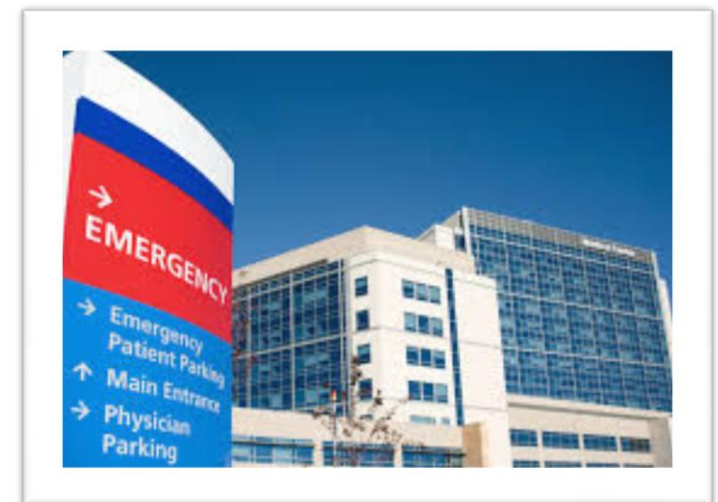
Summary

- Pollen is an important aeroallergen – asthma, hay fever, respiratory hospital admissions

- Grass, trees and weed pollen allergenic - most sufferers allergic to one or two species only

- Health impact studies using these maps could determine which species cause most hospital admissions

Rachel.McInnes@metoffice.gov.uk

Any Questions?

Rachel.McInnes@metoffice.gov.uk

www.metoffice.gov.uk