



Soil



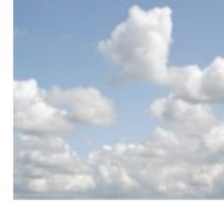
Air



Water



Biodiversity



Climate

# Open Air Laboratories (OPAL) – a case study of engagement, raising awareness, evidence and reporting

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OPAL  
Imperial College, London





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## OPAL Background

- *Changing Spaces* – £200m from Big Lottery Fund supporting wide-range of environmental projects
- OPAL awarded £11.8m by BLF England board
- Supported by Defra and the Environment Agency as associate partners
- 5 year programme commenced in December 2007
- Surveys on Soil, Air, Water, Biodiversity and Climate
- Additional awards from BLF of £1.3m (2010) and £1.4m (2012)
- Two further surveys developed Bugs Count and Tree Health



Department  
for Environment  
Food & Rural Affairs





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## OPAL objectives

1. A change of lifestyle - a purpose to spend time outside observing and recording the world around us
2. An exciting and innovative educational programme that can be accessed and enjoyed by all ages and abilities
3. A new generation of environmentalists
4. A much greater understanding of the state of the natural environment
5. Stronger partnerships between the community, voluntary and statutory sectors







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## The OPAL Survey Model

1. Choose topics (policy relevant), appoint lead scientists
2. Define research questions
3. Develop Methodology
4. Design Field Pack
5. Education and training materials
6. Establish national community science network to promote, train and support local communities and schools to deliver research
7. National and local media programme
8. Website (news, events, references, resources, competitions)
9. Data – database with instant feedback, data analysis, share results
10. Manage to budget, time and performance criteria



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# Original OPAL programme

## Research & Education Centres

**Soil:** Imperial College London

**Air:** Imperial College London

**Water:** University College London

**Biodiversity:** Natural History Museum, Open University, Imperial College London

**Climate:** UK Meteorological Office

**Bugs Count:** Natural History Museum

**Tree Health:** Fera and Forest Research

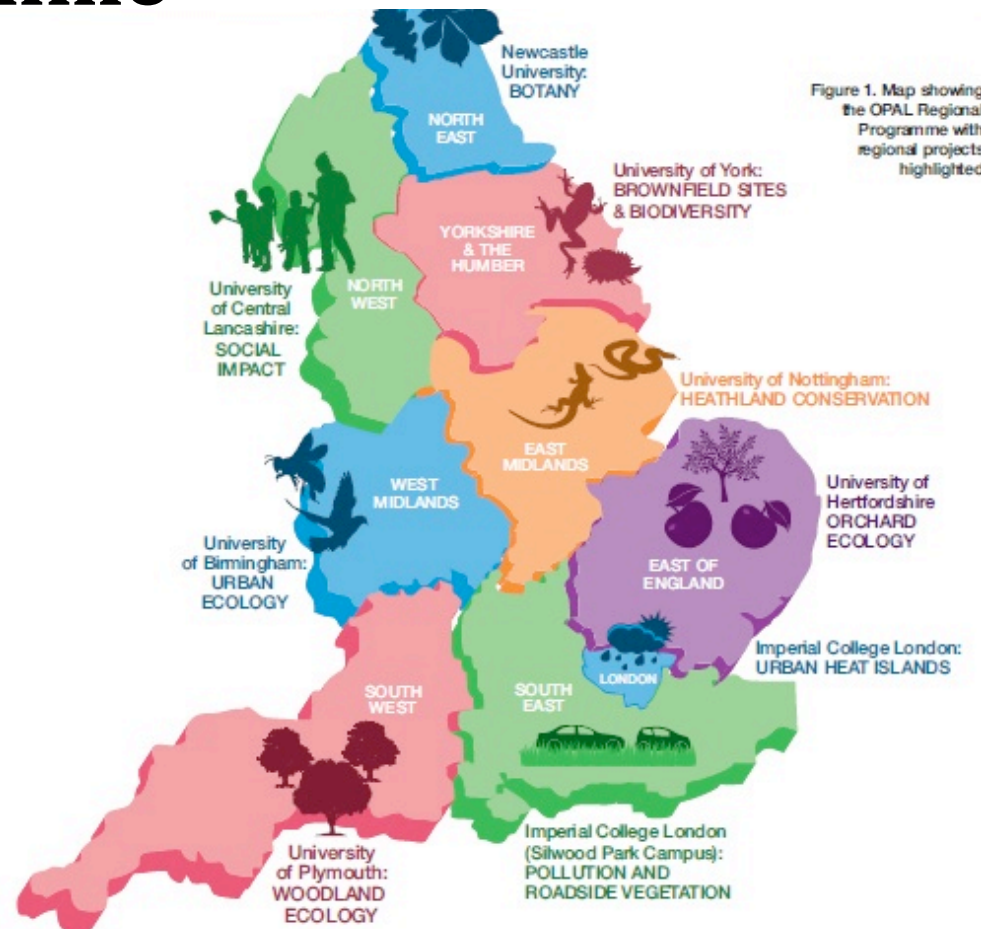
## Support Services

Natural History Museum

Field Studies Council

Royal Parks

National Biodiversity Network





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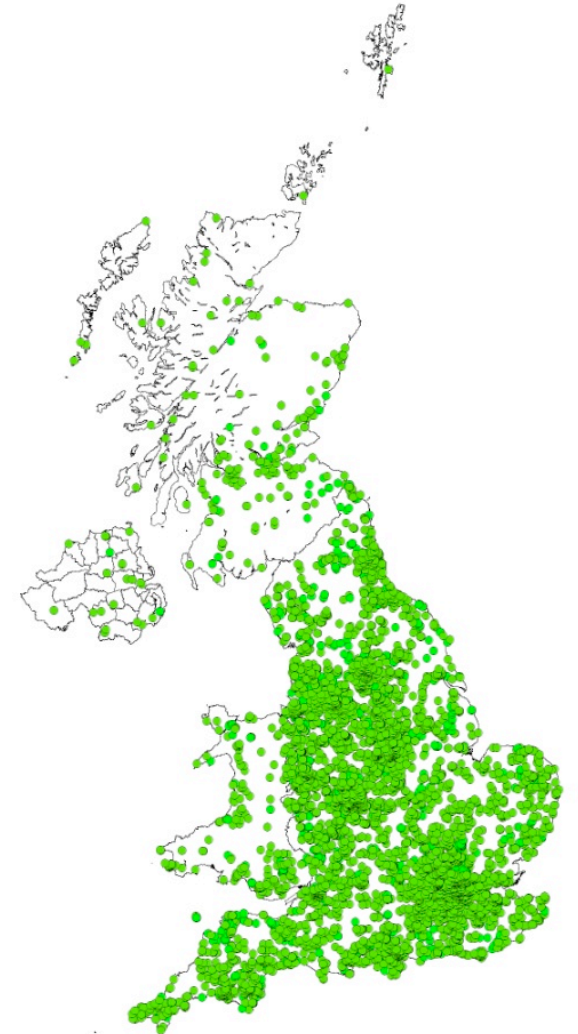


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## Going forward: OPAL-UK

- BLF funding England only – however interest from Scotland, Wales and Northern Ireland
- BLF launch ‘Supporting UK-Wide Great Ideas’
- New 3 year, £3m **OPAL-UK** started in December 2013
- Similar objectives, greater emphasis i) deprived communities; ii) working with children and young people; iii) skills and employability agenda; and (iv) engagement







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# OPAL-UK

Glasgow Science Centre

Queen's College Belfast

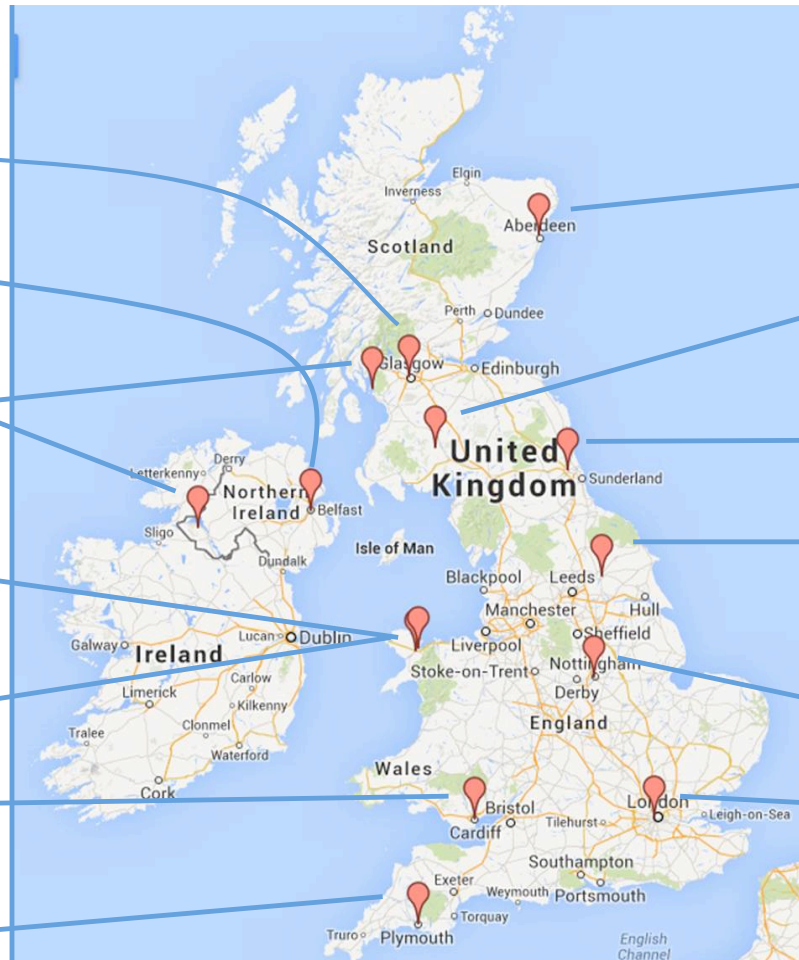
Field Studies Council

North Wales Wildlife Trust

Cofnod

National Museum Wales

University of Plymouth



University of Aberdeen

The Conservation Volunteers

Newcastle University

University of York

University of Nottingham

Imperial College London





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## Results, conclusions and lessons learnt

- Citizen science can:
  - *Engage* with the public and *raise awareness* of environmental issues
- Citizens, communities and volunteers can:
  - Provide *evidence* to answer research questions and inform policy
  - Provide *reporting* to support official surveillance





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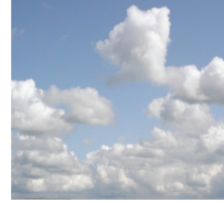
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# Plant pests and disease threats increasing







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# OPAL Tree Health Survey



- Consortium: OPAL (Imperial College), Fera, Forest Research, Natural History Museum, Field Studies Council and many others
- Activity 1 Get to know your trees (*“engagement”*)
- Activity 2 How healthy are your trees? (*“raising awareness”* and *“evidence”*)
- 6 “Most Unwanted” (*“reporting”* and *“evidence”*)
  - Chalara ash dieback
  - Asian longhorn beetle
  - Citrus longhorn beetle
  - Emerald ash borer
  - Oak processionary moth
  - Pine processionary moth



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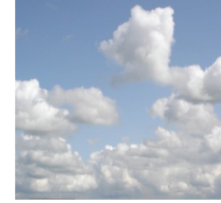
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# OPAL Engagement



• **855,856** people have actively participated in OPAL activities in the field

• More than **2,000** schools have taken part, many from areas of high deprivation

• Over **1,000** organisations are involved

• Approximately **270,000** packs have been distributed to the public

• Over **50,000** surveys submitted





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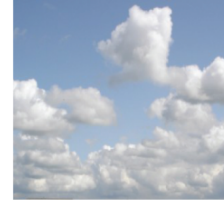
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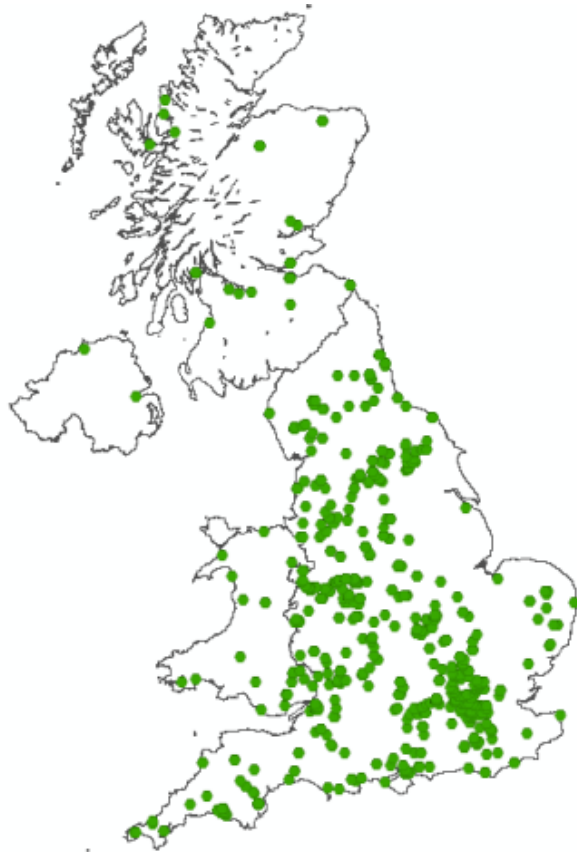
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# OPAL Tree Health Engagement



- 50,000 survey packs produced plus 2,000 in Welsh
- At least 750 'trainers' trained
- 55 sign-ups to be a Tree Buddy
- 38% surveys carried out by school children (12% primary, 26% secondary)
- 25% surveys carried out as part of an adult volunteer group
- 29% surveys carried out with family or friends
- 91% participants indicated that they had learnt something new and 84% had learnt new skills.



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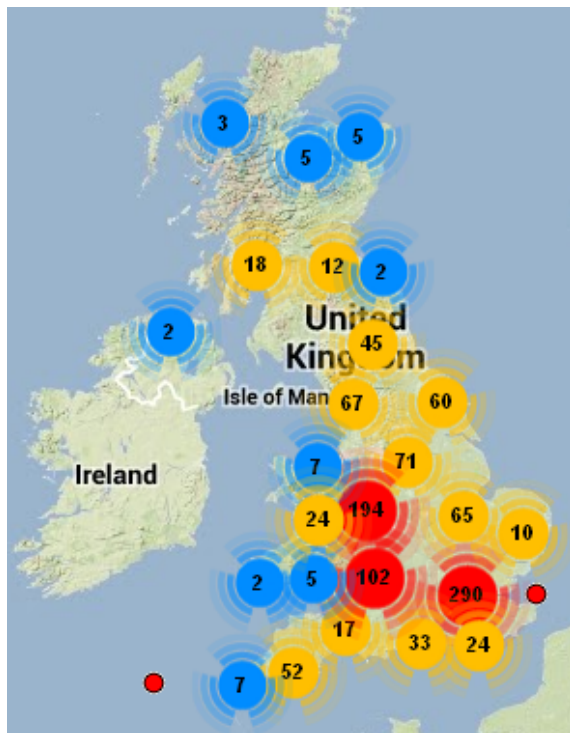
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# OPAL Tree Health Raising Awareness



- >1,194 surveys submitted (2,300 trees)
- Oak (28% of all trees), Ash (19%) and Horse Chestnut (12%)
- Other trees include Sycamore, Silver Birch, Beech, Elm, London Plane and many others
- 43% of oaks had a pest or disease
- 73% of ash had a pest or disease
- 74% of Horse Chestnut had one pest or disease, 40% had two diseases and 10% had three diseases!



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## OPAL Evidence

- **Number** Huge number of data points over 25,000 sites
- **Spread** Citizen scientists can survey in areas where professional scientists can't get to e.g. gardens
- **Quality** citizen scientists achieved 99.3 % accuracy in identifications of *Xanthoria* spp, *Physcia* spp and *Usnea* spp.
- **Relevance** citizen science records for lichen bio-indicators align well with pollution data collected by professional scientists (Air Survey)
- **Publications** - A list of all of OPAL's publications can be found on the Imperial website:

<http://www3.imperial.ac.uk/opal/publications>





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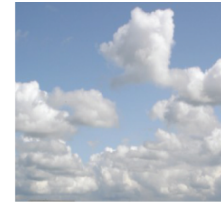
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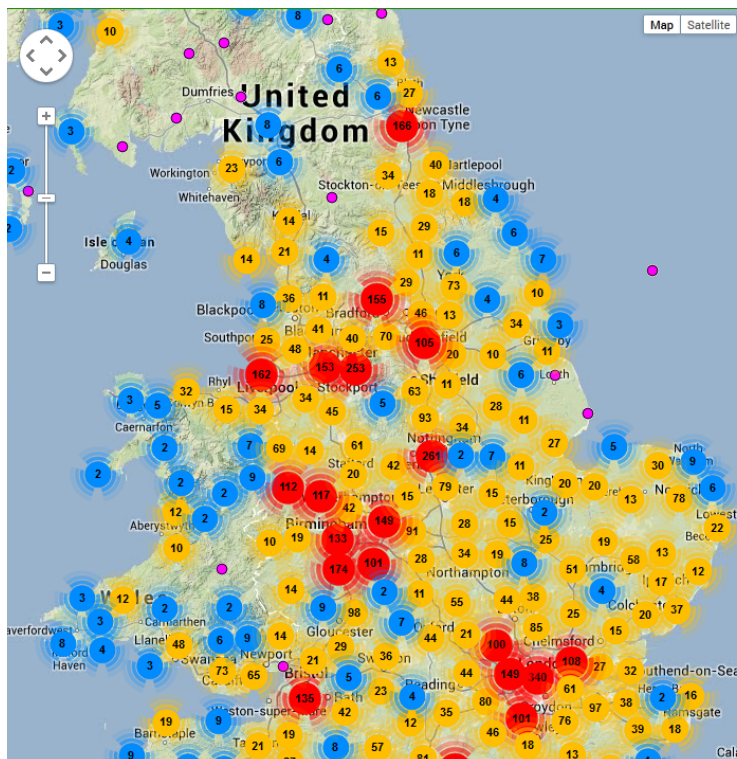
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# OPAL Evidence



Total number of surveys completed: 8558  
 Thank you to Guest for the latest survey results.



## Bugs in urban areas

### How many bugs were counted in urban areas?

We invited you to go on a Species Quest and keep your eyes peeled for **six key invertebrates**. You spotted **nearly 9,000** of them while doing your Bugs Count surveys.

One of the things we wanted to find out was how many species were found in very densely populated places such as cities and towns compared to less populated areas such as villages and hamlets. Can you notice any differences?

### Size of bug represents the average number of individuals found in each environment



Nearly four times more small Tortoiseshell butterflies were found in rural areas than in urban areas. Although their breeding habitats are often associated with human environments, these butterflies may be doing better in less populated places because there are more nettles, which the larvae feed on, and nectar sources such as bramble and thistle for the adults. See the **microhabitats** they were found in most often.

Almost equal numbers of Tree Bumblebees were found in urban areas and rural areas. Perhaps these species do well in urban environments because they can use the structure and warmth of buildings for nesting and feed on flowering plants and trees in allotments and gardens. See the **microhabitats** they were found in most often.



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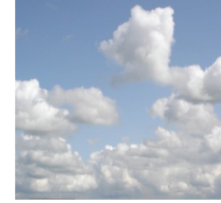
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# OPAL Evidence

Environmental Pollution 159 (2011) 2203–2210



Contents lists available at ScienceDirect

Environmental Pollution

journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)



## Review

### Open Air Laboratories (OPAL): A community-driven research programme

L. Davies<sup>a,\*</sup>, J.N.B. Bell<sup>a</sup>, J. Bone<sup>a</sup>, M. Head<sup>a</sup>, L. Hill<sup>a</sup>, C. Howard<sup>b</sup>, S.J. Hobbs<sup>d</sup>, D.T. N. Rose<sup>c</sup>, C. Ryder<sup>a</sup>, L. Seed<sup>a</sup>, G. Stevens<sup>b</sup>, R. Toumi<sup>a</sup>, N. Voulvoulis<sup>a</sup>, P.C.L. White<sup>a</sup>

<sup>a</sup>Imperial College London, London SW7 2AZ, UK

<sup>b</sup>Natural History Museum, London SW7 5BD, UK

<sup>c</sup>Department of Geography, University College London, London WC1E 6BT, UK

<sup>d</sup>Environment Department, University of York, Heslington, York YO10 5DD, UK

OPEN ACCESS Freely available online



## Changing Bee and Hoverfly Pollinator Assemblages along an Urban-Rural Gradient

Adam J. Bates<sup>1,\*</sup>, Jon P. Sadler<sup>1</sup>, Alison J. Fairbrass<sup>1</sup>, Steven J. Falk<sup>2</sup>, James D. Hale<sup>1</sup>, Tom J. Matthews<sup>1</sup>

<sup>1</sup>Geography, Earth and Environmental Sciences, The University of Birmingham, Birmingham, West Midlands, United Kingdom, <sup>2</sup>Warwickshire Museum, Warwick, Warwickshire, United Kingdom

## Habitat Composition and Connectivity Predicts Bat Presence and Activity at Foraging Sites in a Large UK Conurbation

James D. Hale<sup>1,\*</sup>, Alison J. Fairbrass<sup>2</sup>, Tom J. Matthews<sup>3</sup>, Jon P. Sadler<sup>1,\*</sup>

Environ: <sup>1</sup>School of Geography, Earth and Environmental Sciences, The University of Birmingham, Birmingham, United Kingdom, <sup>2</sup>Imperial College London, Silwood Park Campus, Ascot, United Kingdom, <sup>3</sup>School of Geography and the Environment, University of Oxford, Oxford, United Kingdom



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journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)



## Modelling relationships between lichen bioindicators, air quality and climate on a national scale: Results from the UK OPAL air survey

Lindsay Seed<sup>a</sup>, Pat Wolseley<sup>b,\*</sup>, Laura Gosling<sup>c</sup>, Linda Davies<sup>c</sup>, Sally A. Power<sup>a,d</sup>

<sup>a</sup>Imperial College London, Division of Biology, Silwood Park, Ascot, Berkshire SL5 7PY, UK

<sup>b</sup>Natural History Museum, Cromwell Rd, London SW7 5BD, UK

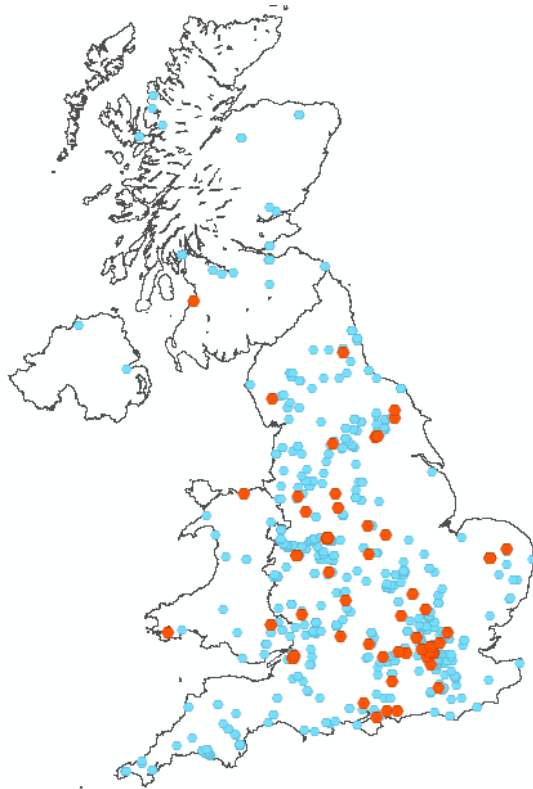
<sup>c</sup>Centre for Environmental Policy, Imperial College London, London SW7 1NA, UK

<sup>d</sup>Hawkesbury Institute for the Environment, University of Western Sydney, Locked Bag 1797, Penrith, 2751 NSW, Australia

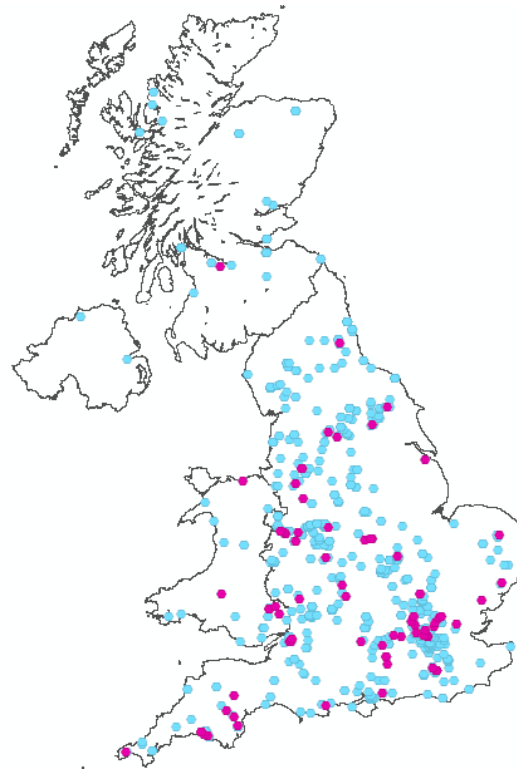
## OPAL Air Survey

- Citizen scientists can collect valuable species-level data
- Citizen scientists can collect lichen data in new geographic areas
- Citizen scientists found that lichens can be used as effective bio-indicators for air pollution (Nitrogen and Sulphur)

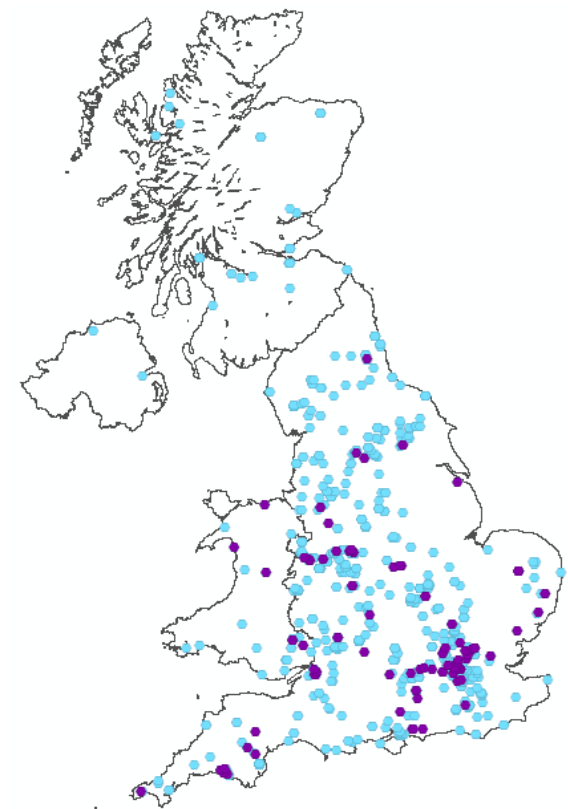
# OPAL Tree Health Evidence



**Bleeding Canker**  
28% trees affected



**Leaf Blotch**  
36% trees affected



**Leaf mining moth**  
54% trees affected





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# OPAL Tree Health Reporting

## “Most Unwanted”

- *Chalara* ash dieback: 12 reports
- Emerald ash borer: 3 reports (including one suspect specimen)
- Oak Processionary Moth: 3 reports
- Citrus Longhorn Beetle: 2 reports
- Asian Longhorn Beetle: no reports
- Pine Processionary Moth: no reports
  
- All negative or in known affected areas (*Chalara*)



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# OPAL Tree Health Reporting





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# OPAL Tree Health Reporting



**Phew!**

- Native Green dock beetle (*Gastrophysa viridula*)

**NOT**

- Emerald ash borer (*Agrilus planipennis*)





# A few lessons learnt

- Explain to participants why data are needed
- Involve customers and participants in survey design
- People are busy, do not always read information – make survey visually appealing, simple language, interesting, bite-size chunks
- Tailor survey to people's ability - If too difficult find another way (photograph or sample)
- Provide training
- Network of local champions essential
- Data entry: remove ambiguity e.g. numeric only, specify units
- Get contact details if follow-up needed
- Data submission: encourage participants to submit all results even negative ones!
- Data submission: provide options; not everyone has a Smartphone
- Value people's input with instant feedback and regular updates
- Set baselines so that you can measure impact
- Get full buy-in from partners especially senior managers e.g. to provide resources, synchronise publicity etc.
- Data transfer: compatibility with receiving databases
- Pool of willing volunteers is finite - work collaboratively and share data to avoid confusion, avoid saturation
- Not just about numbers; stories are important too



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# Motivation

## Participants:

- Enjoyment
- Altruism
- Education
- (For outdoor citizen science) benefits to health and wellbeing; social cohesion
- (Longer term) recognition from within citizen science communities, including sense of competition

## Scientists:

- Large data sets over wide geographic areas and temporal scales
- New research advances and early warning system
- Tap local and lay knowledge
- Free source of labour, skills, computational power, etc.
- Multi disciplinary collaboration
- Greater recognition and impact of research
- Link to policy
- New funding opportunities



## Imperial vision:

- Developing next generation of researchers, scientists and academics
- Commitment to public engagement in research and communicating the importance of science and its benefits to community