Imperial College London

Forest and woodland insects

Down and out or on the up?

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What am I doing here?

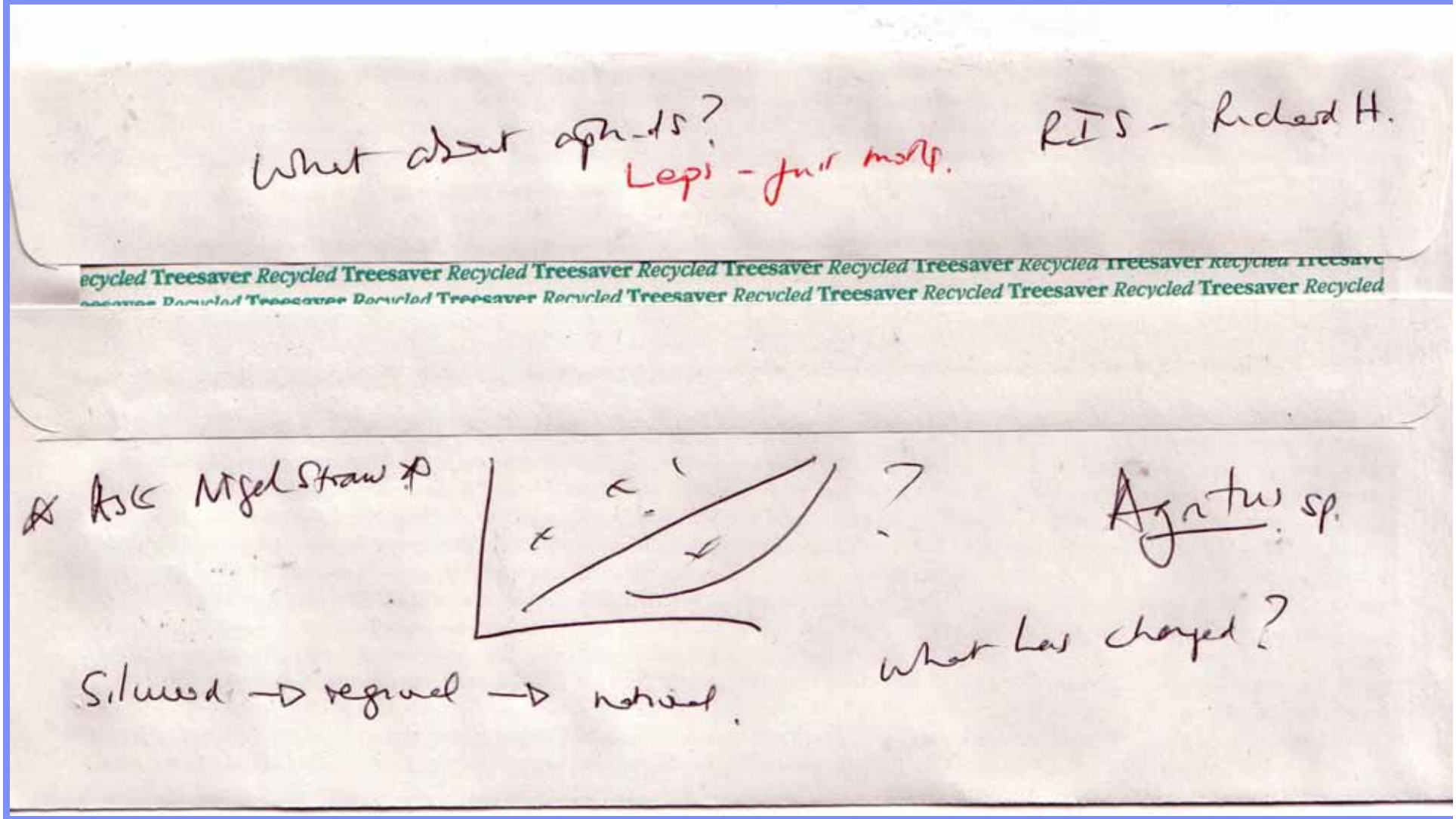
Conference topic

My talk

Simple answer

Graham asked me and I said yes!

What can I talk about?



British Insects in Decline

Scientists are warning of a potential ecological disaster following the discovery that Britain has lost around 7% of its indigenous insect species in just under 100 years.

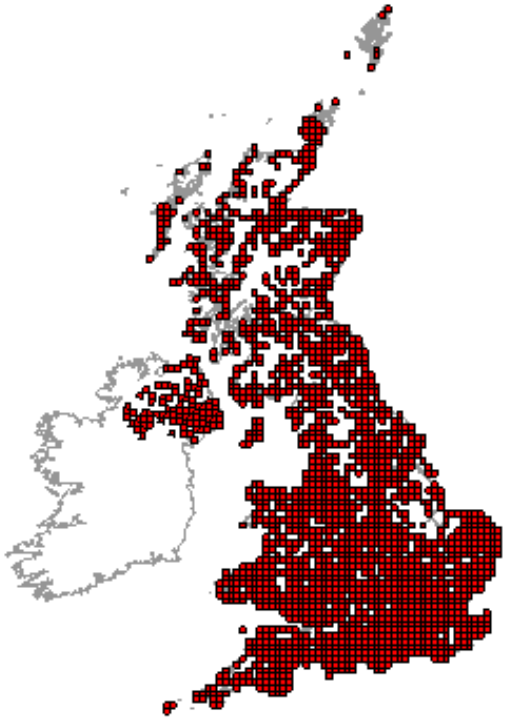
A comparison with figures collected in 1904 have revealed that around 400 species are now extinct, including the black-veined white butterfly, not seen since 1912, the Essex emerald moth and the short-haired bumblebee. Many others are endangered, including the large garden bumblebee, the Fen Raft spider, which is only to be found in a reserve on the Norfolk/Suffolk border, and the once common scarlet malachite beetle, now restricted to just three sites.

Changes to the insects' natural habitats have been responsible for this disastrous decline in numbers. From housing and industrial developments to single-crop farming methods, Britain's countryside has become increasingly inhospitable to its native insects.

This worrying trend may spell trouble for Britain's ecosystems, which depend on the pollination of plants. Oxford University entomologist, Dr George McGavin, quoted in the *Daily Mail* said: "Food chains depend on small things and if you take them away, everything else collapses."

English Nature, in association with other organizations, has set up a number of projects in an attempt to halt this decline.

Numbers declining



Speckled wood – *Pararge aegeria*

Larvae feed on grasses, in particular Cock's foot, *Dactylis glomerata*

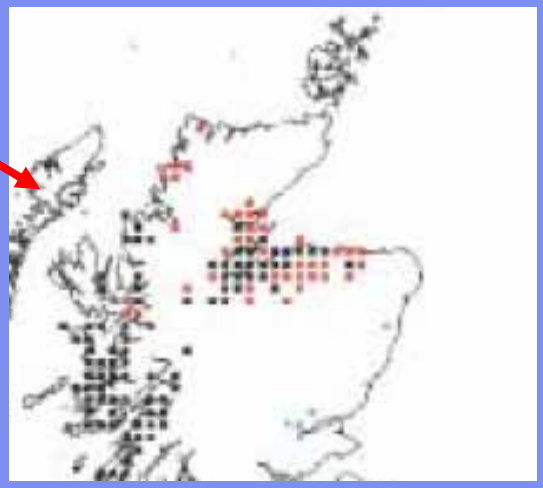
Speckled Wood

- Late 19th and early 20th Century
  - Very low populations
- Increased since 1940s
  - Including Poland, Denmark, Netherlands
- Now going into areas where never before recorded!

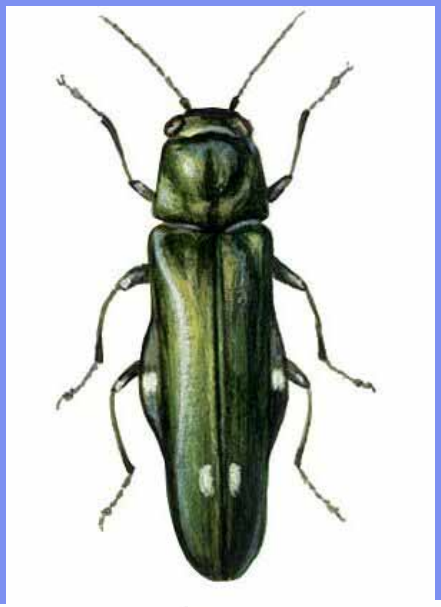
Speckled Wood

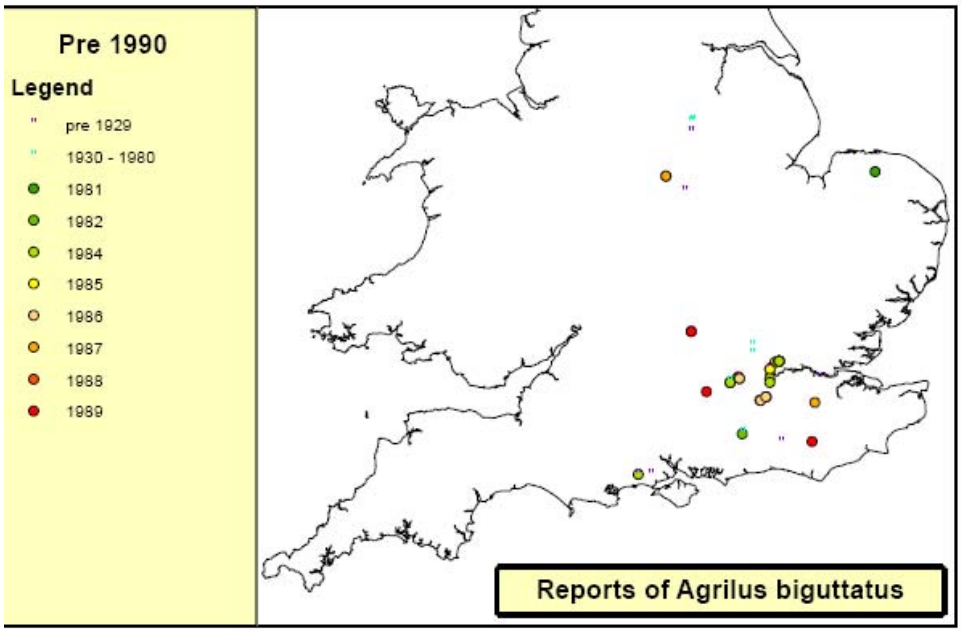
Now in areas never seen before

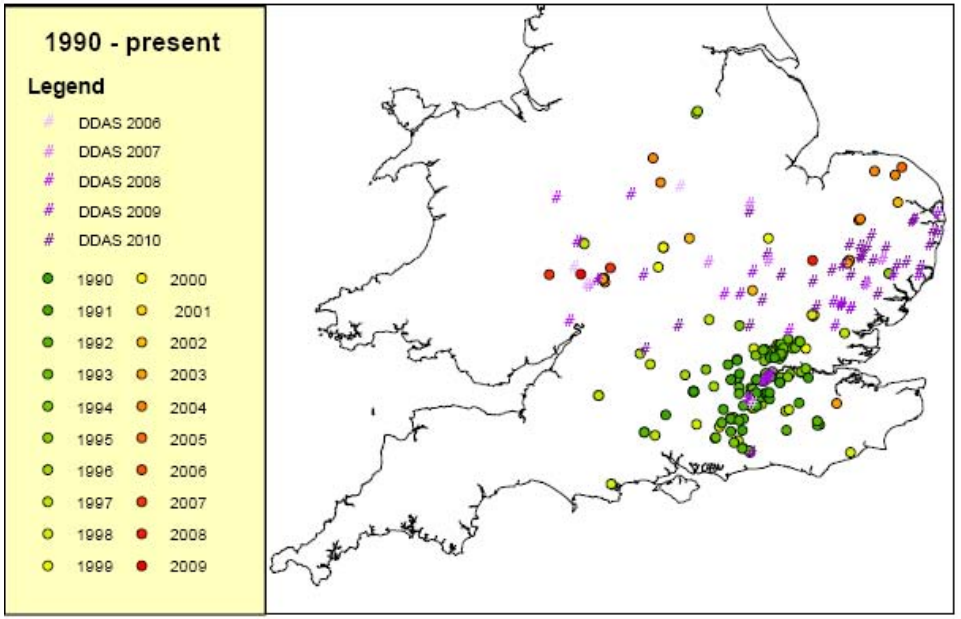
Exploiting pine wood sites



Agrilus biguttatus – on the up

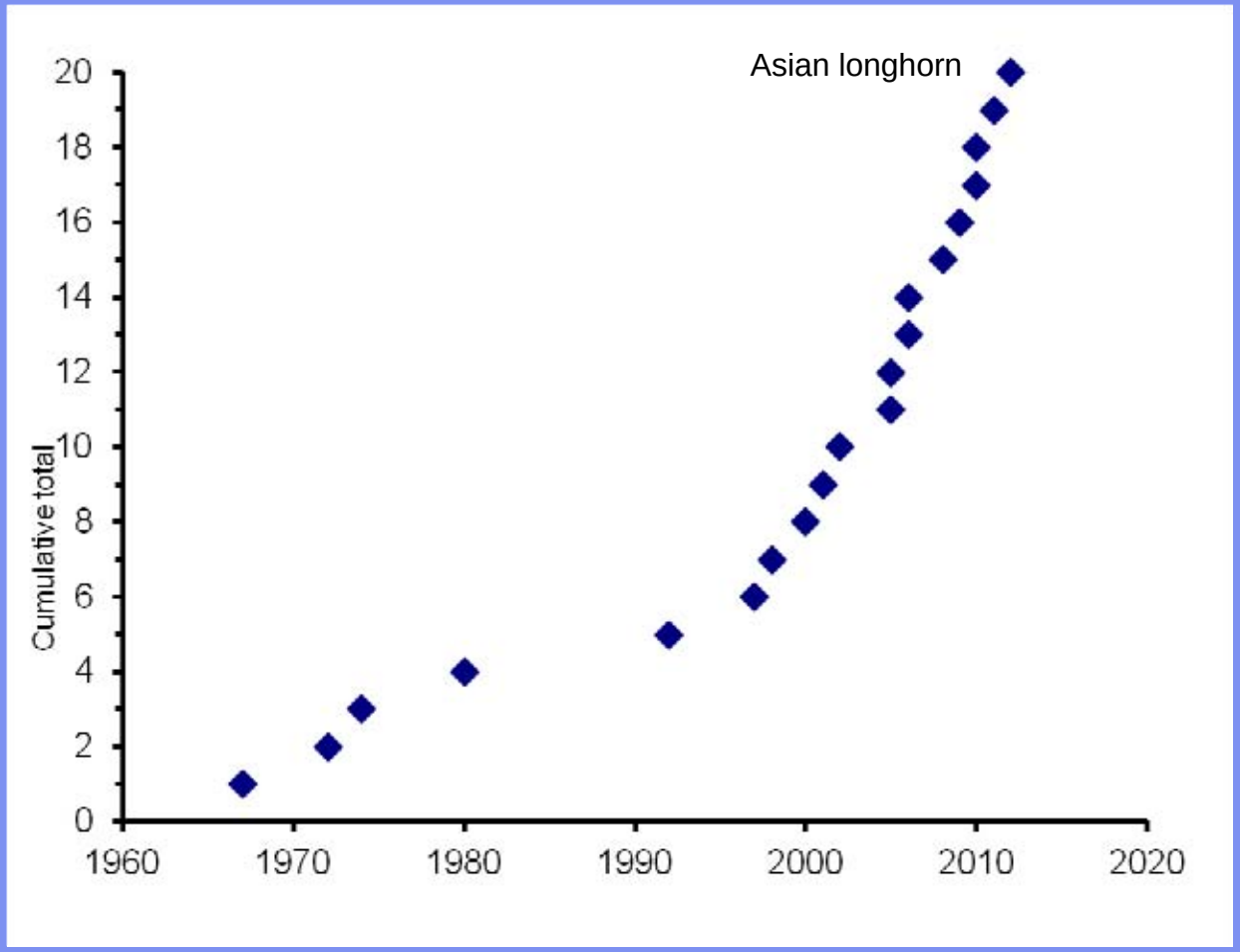






New pests and diseases

Nigel Straw



Silwood Park

The Silwood study

- Silwood Park, Ascot
- 52 trees
  - 3 transects
    - Range in height from 1.7 m to 31 m

- Sampled weekly
  - Aphids
  - Natural enemies
  - Other herbivores

- Other measurements
  - Phenological stage
  - Leaf size
  - flowering

Aphids on sycamore

Life cycles on sycamore

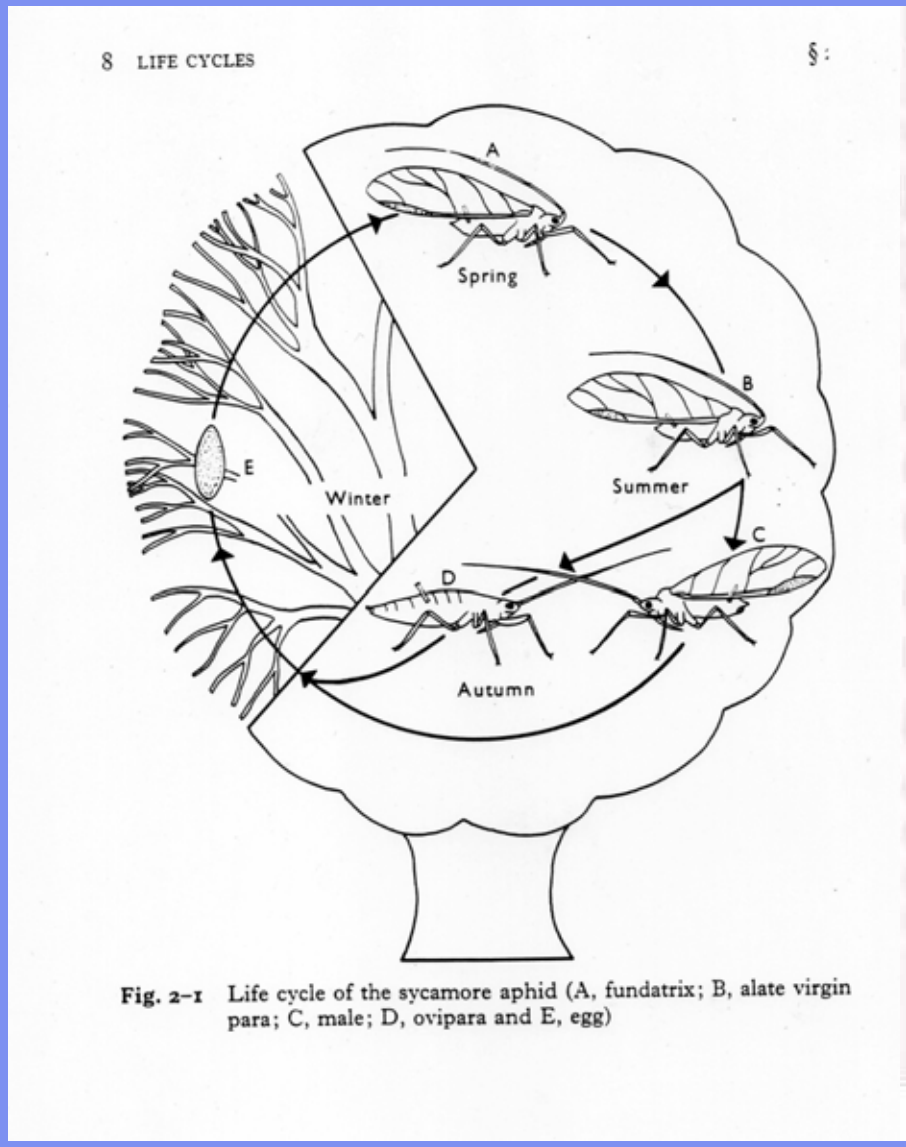
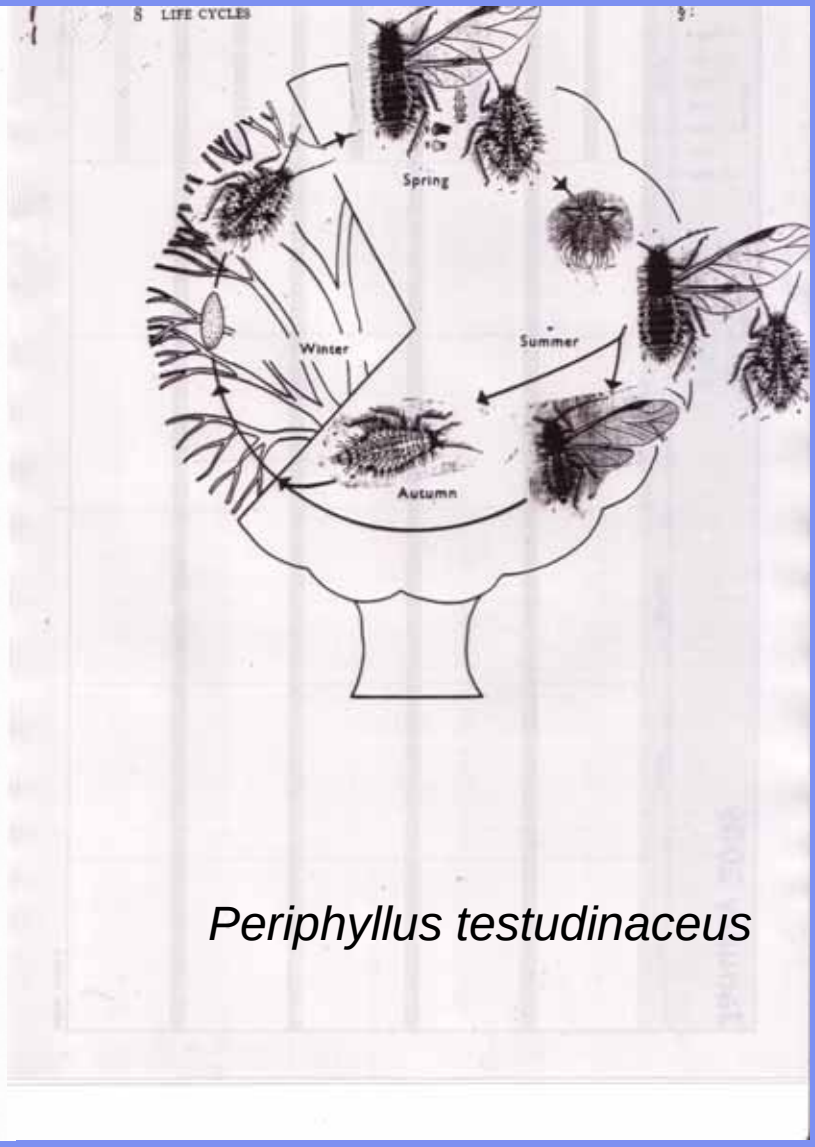
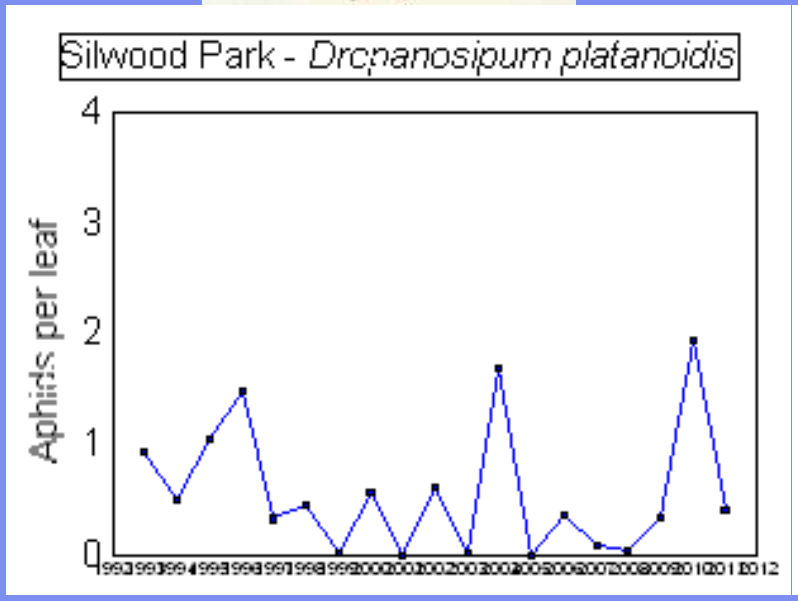


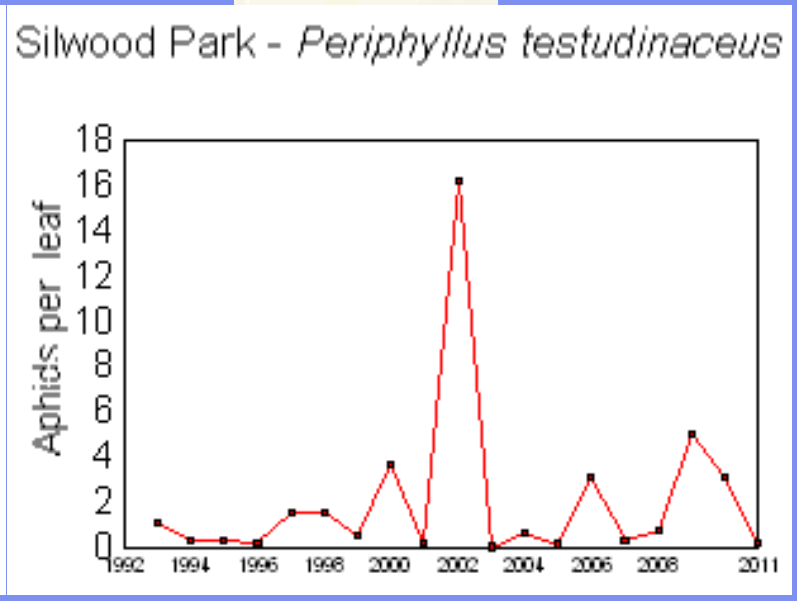
Fig. 2–1 Life cycle of the sycamore aphid (A, fundatrix; B, alate virgin para; C, male; D, ovipara and E, egg)



Periphyllus testudinaceus

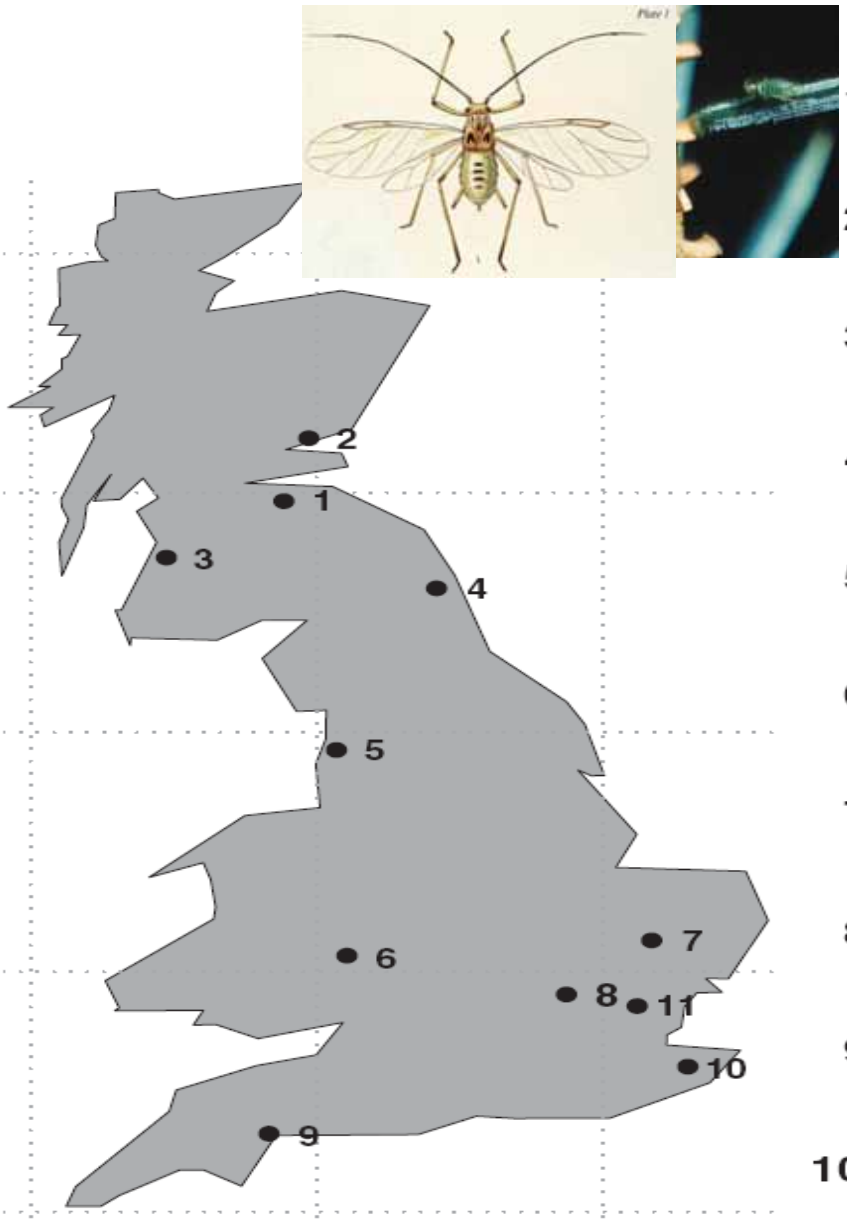
Sycamore and maple aphids

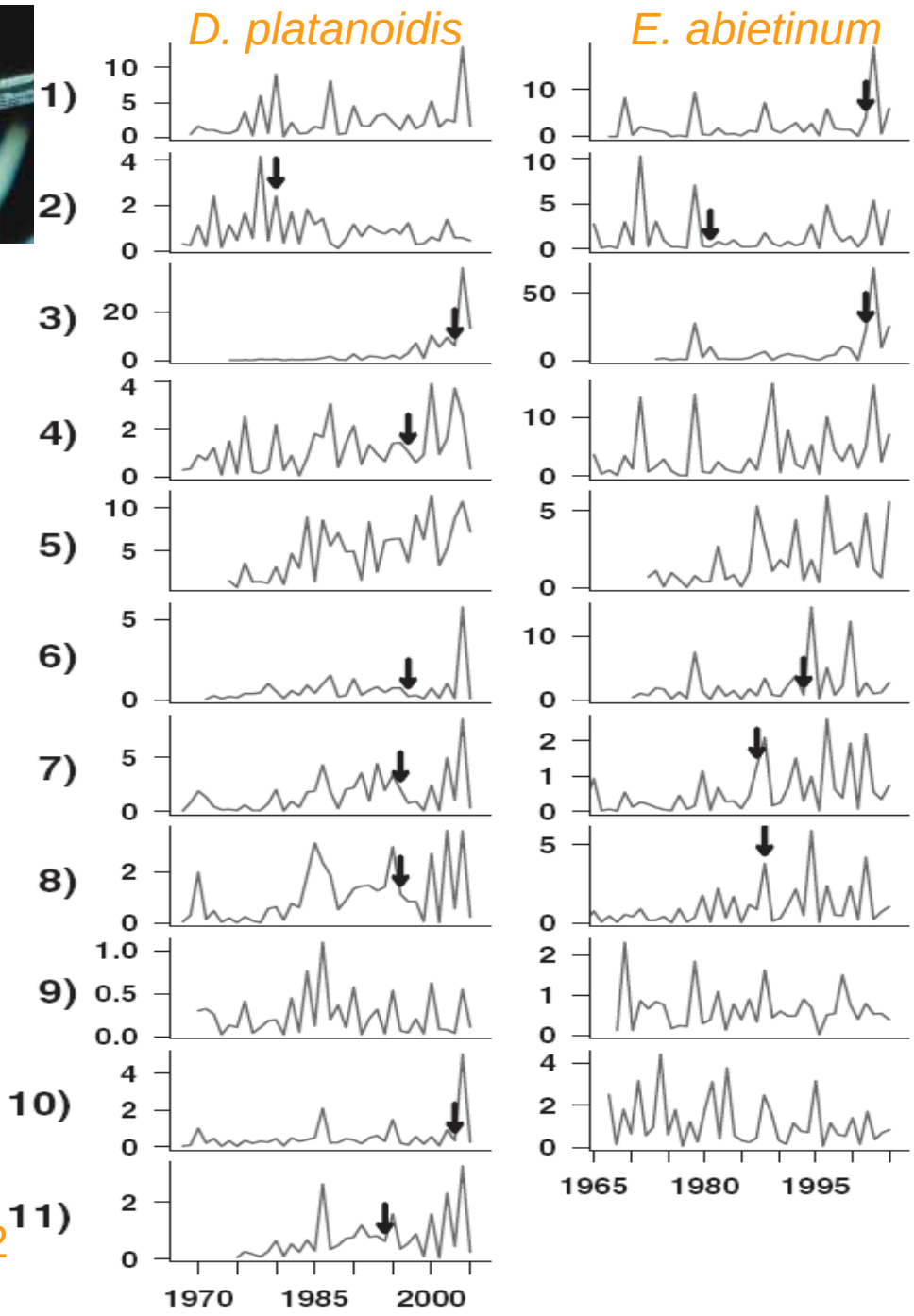




Rothamsted Insect Survey

Richard Harrington





Estay *et al* (2012) *Oikos* **121**, 614-622

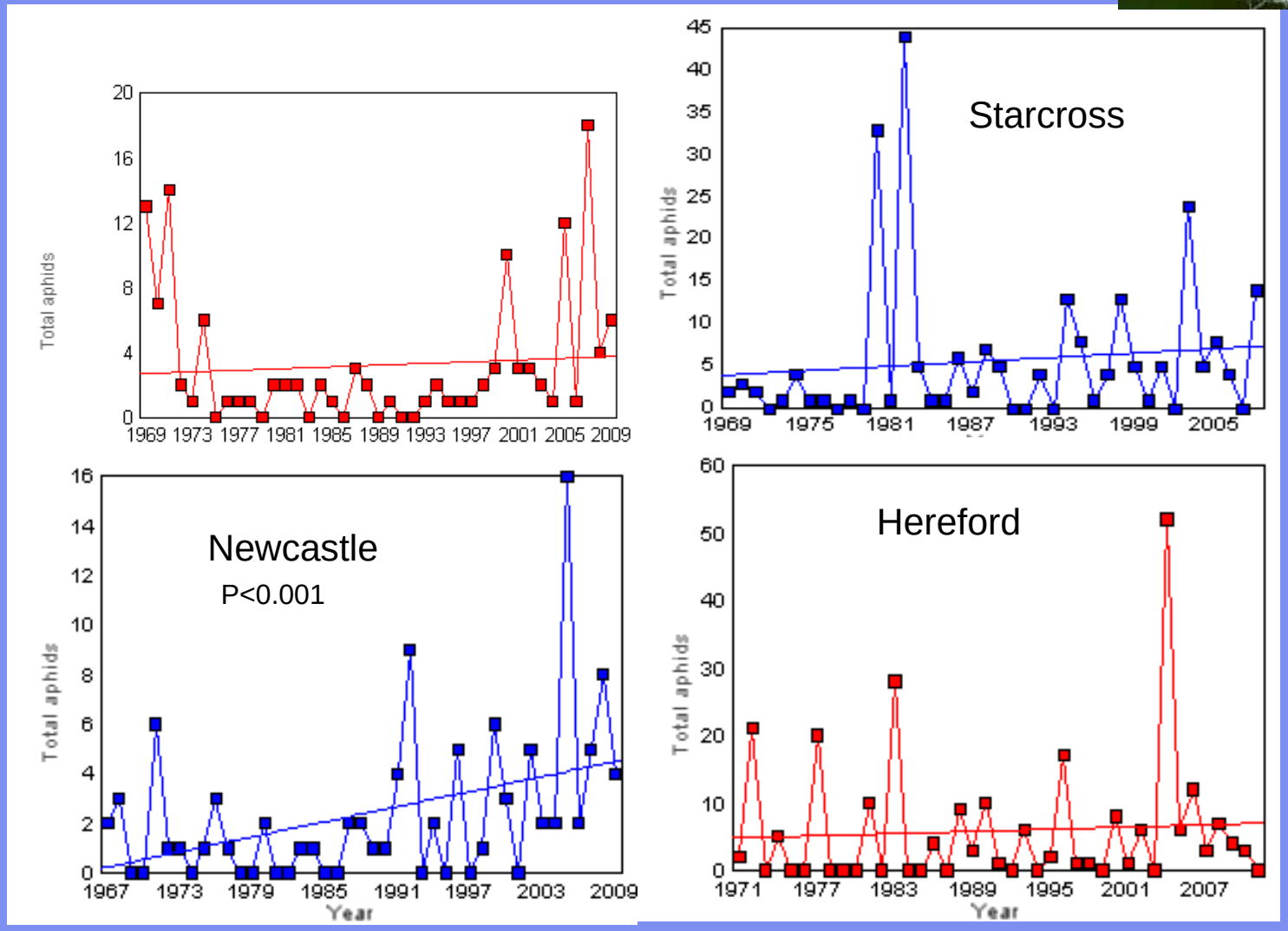
Tree feeding single host aphids (autoecious, holocyclic)

Phyllaphis fagi

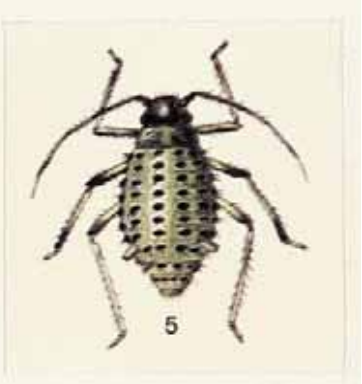
Eucallipterus tiliae

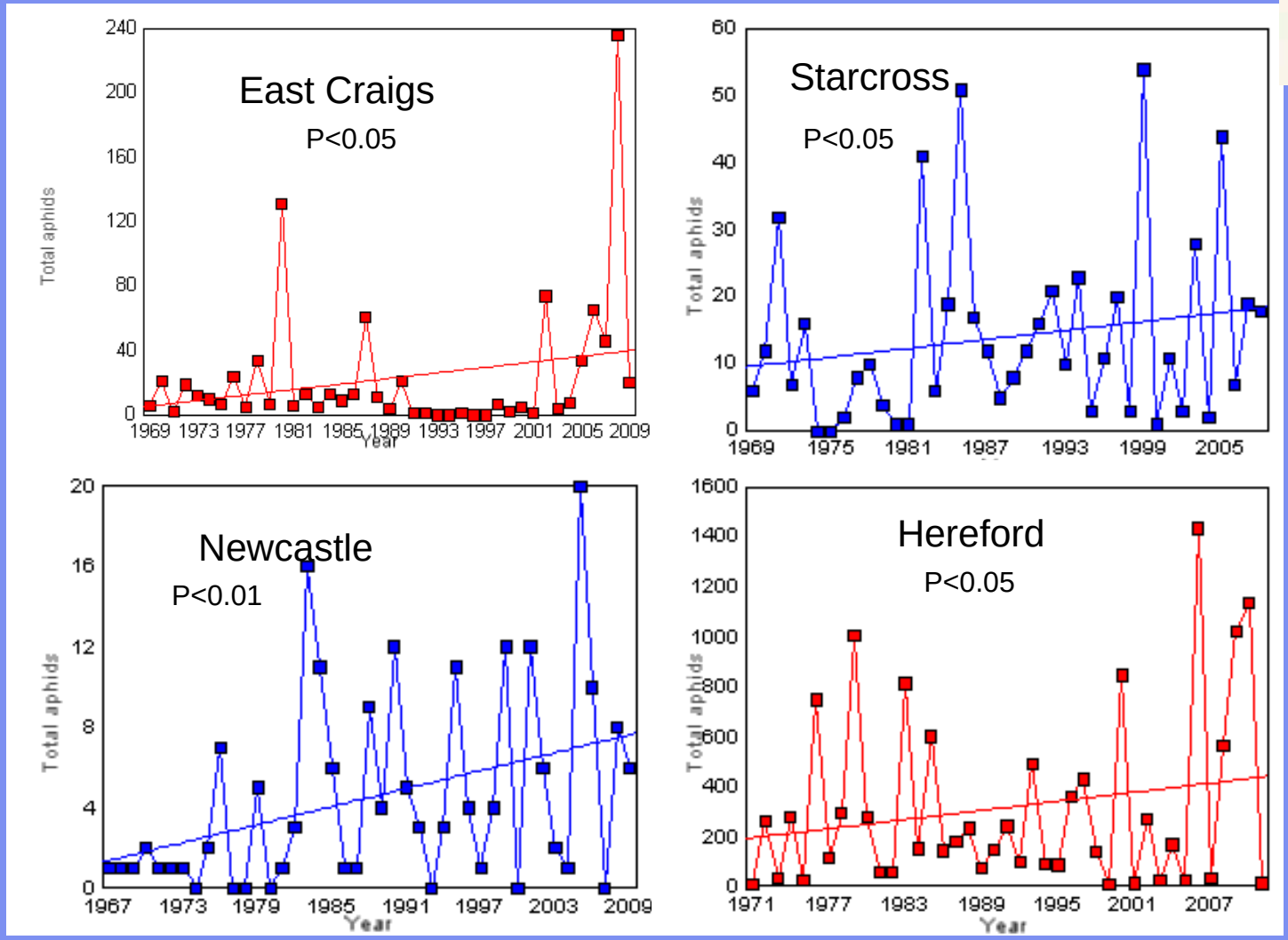
Tuberculatus annulatus

Eucallipterus tiliae

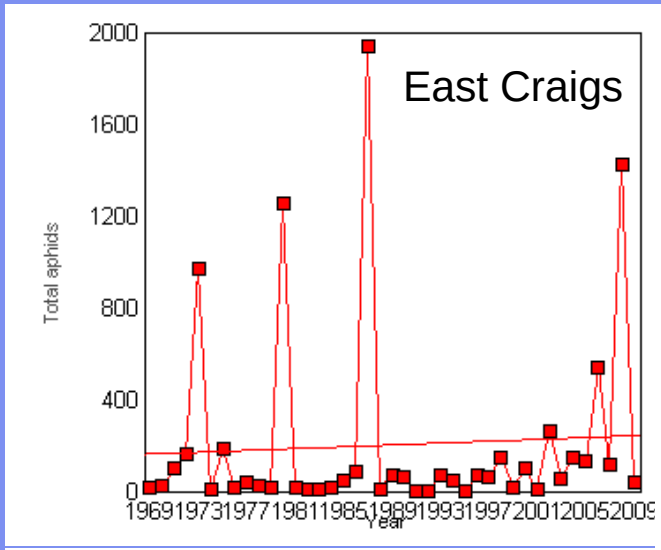


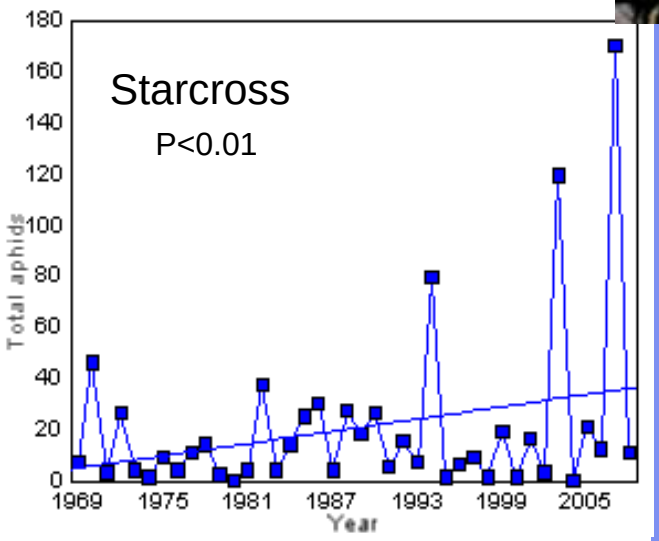
Periphyllus testudinaceus

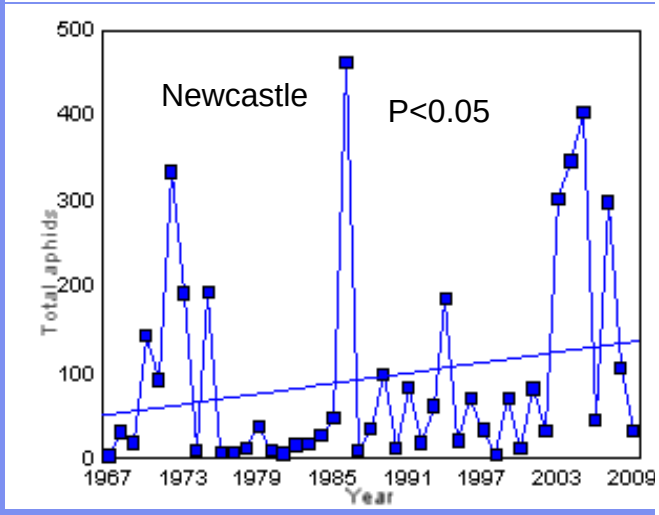


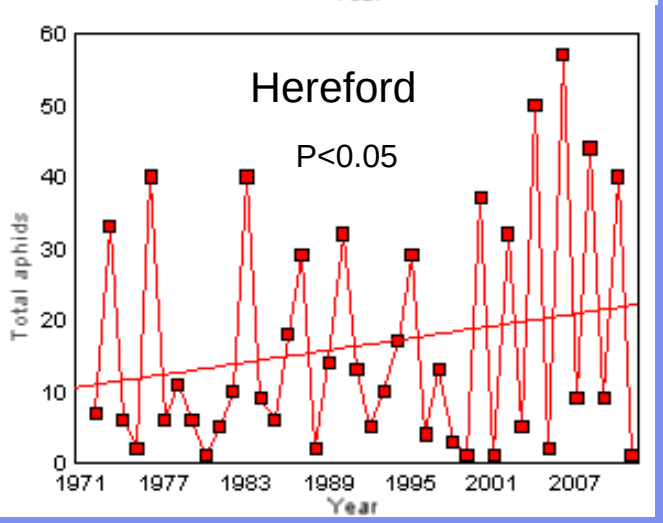


Phyllaphis fagi

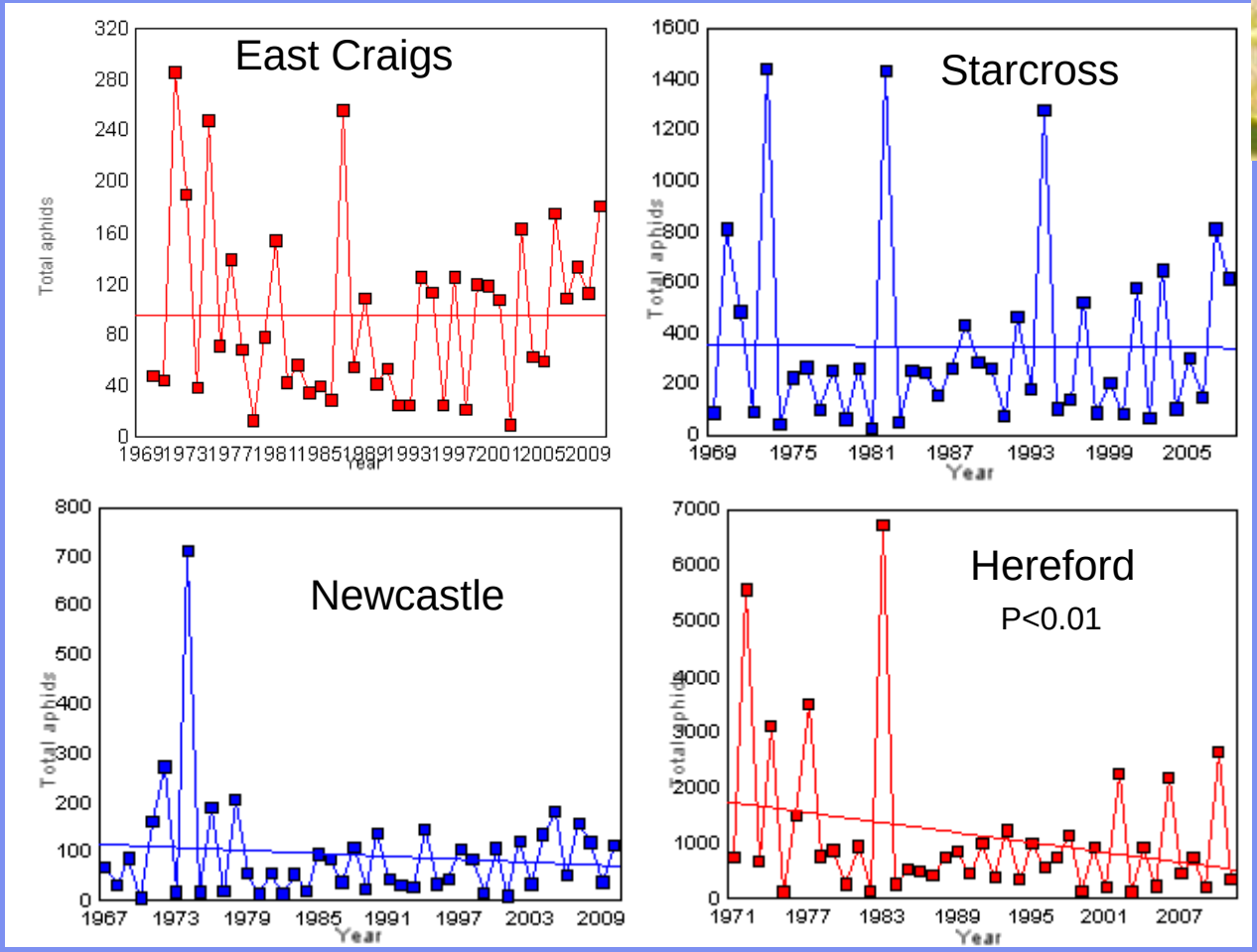






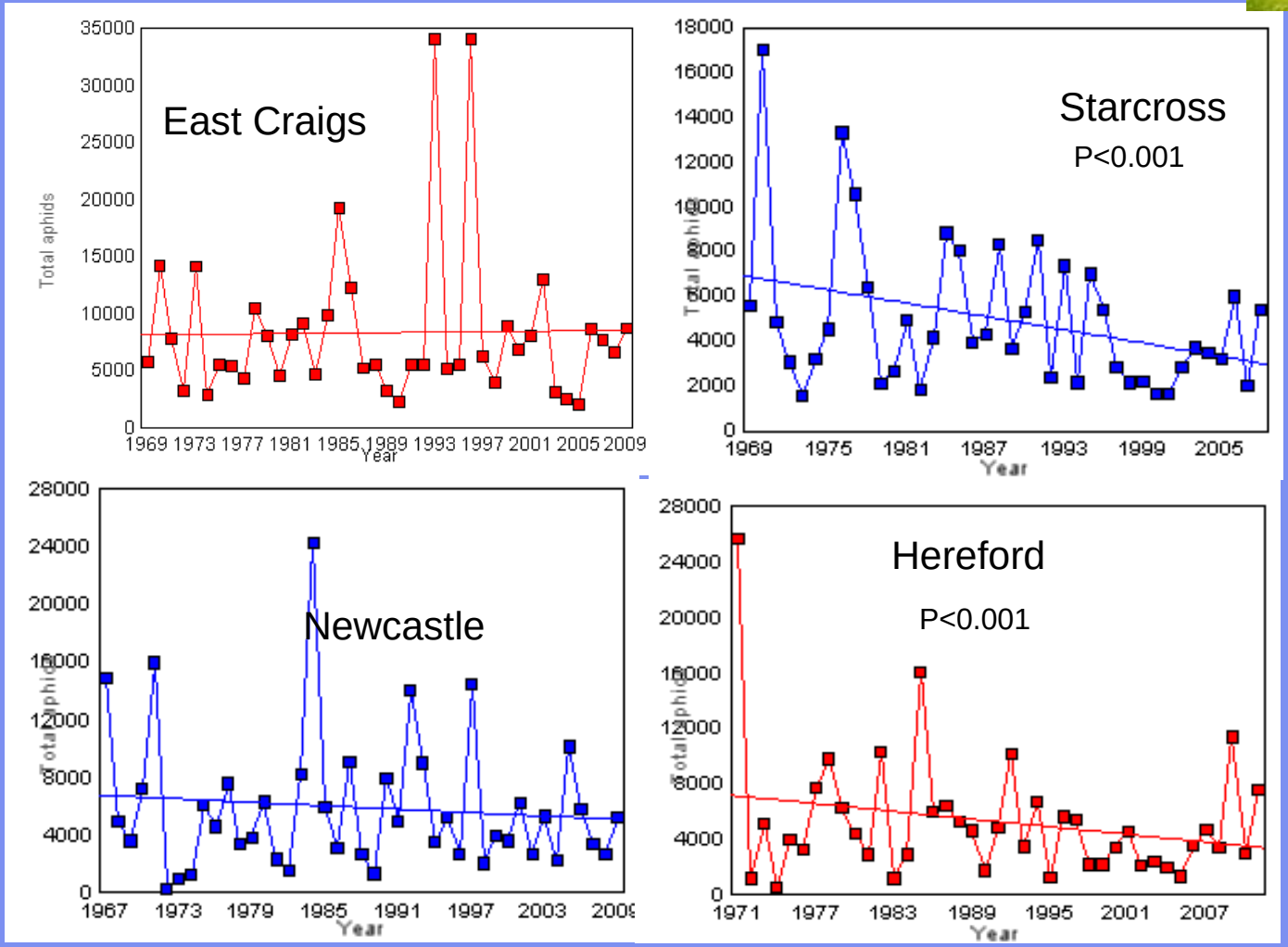


Tuberculatus spp.

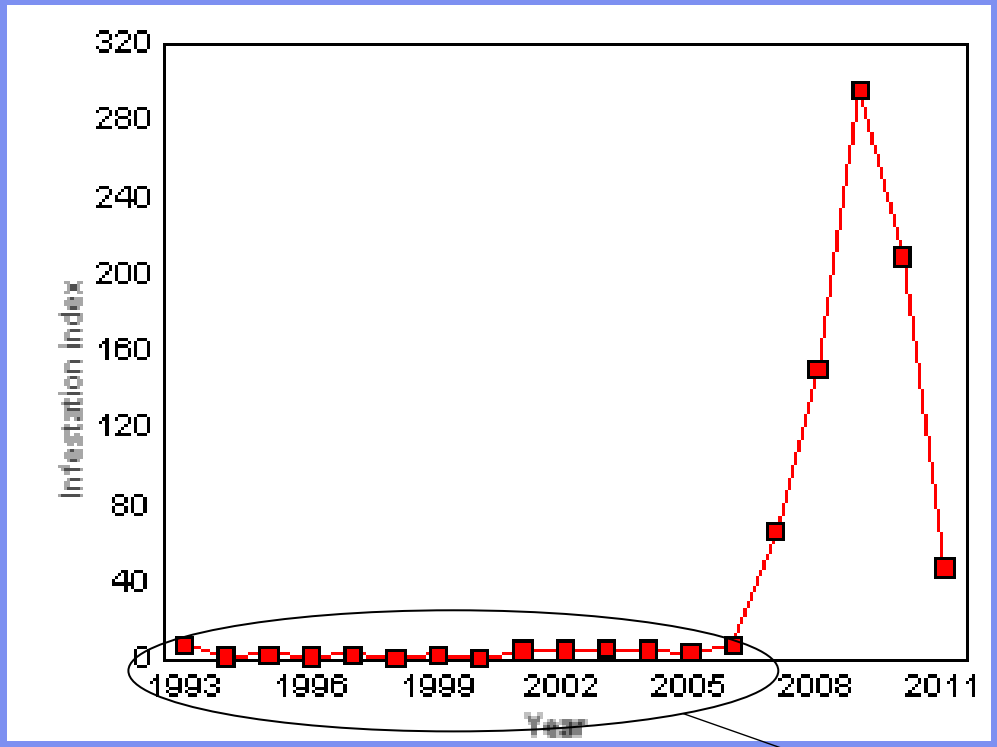


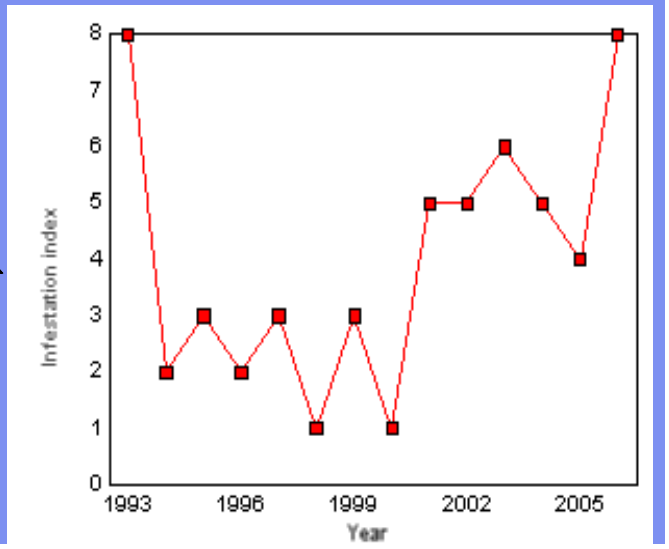
Rhopalosiphum padi

Rhopalosiphum padi



Winter moth at Silwood Park

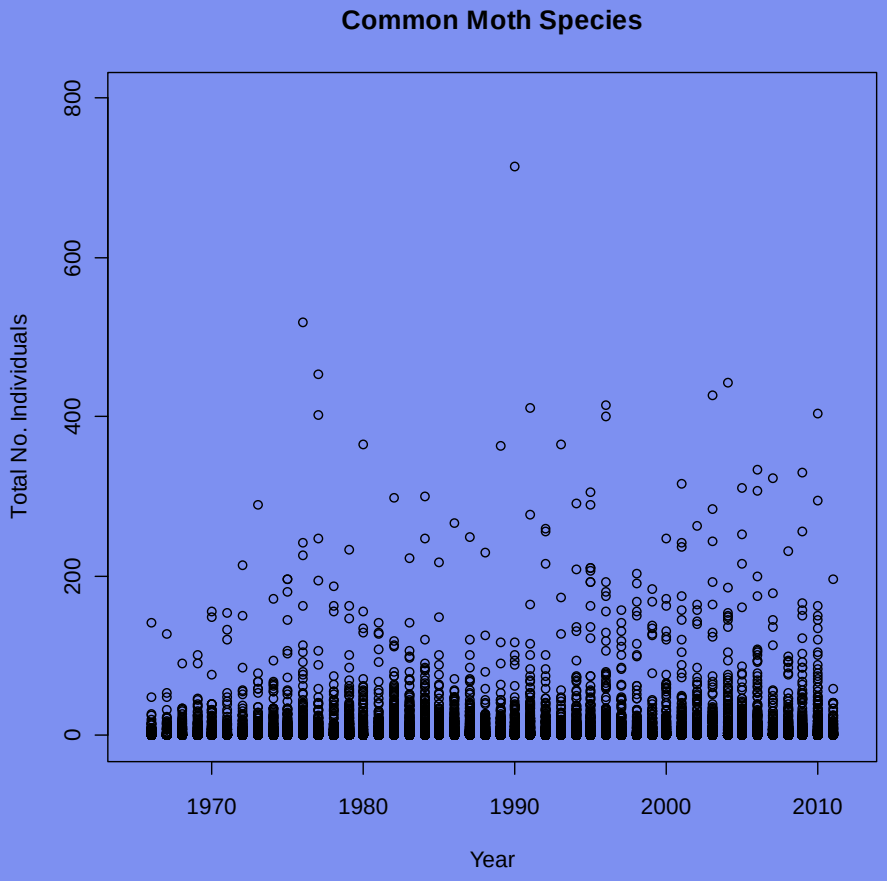


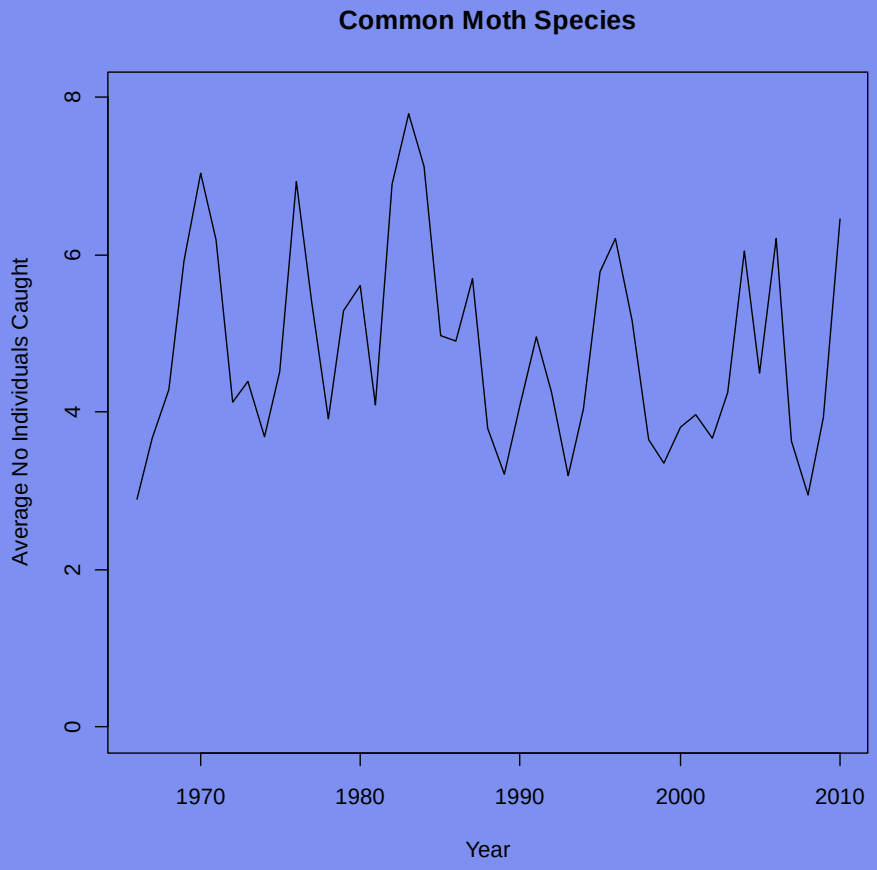


Rothamsted Light Traps

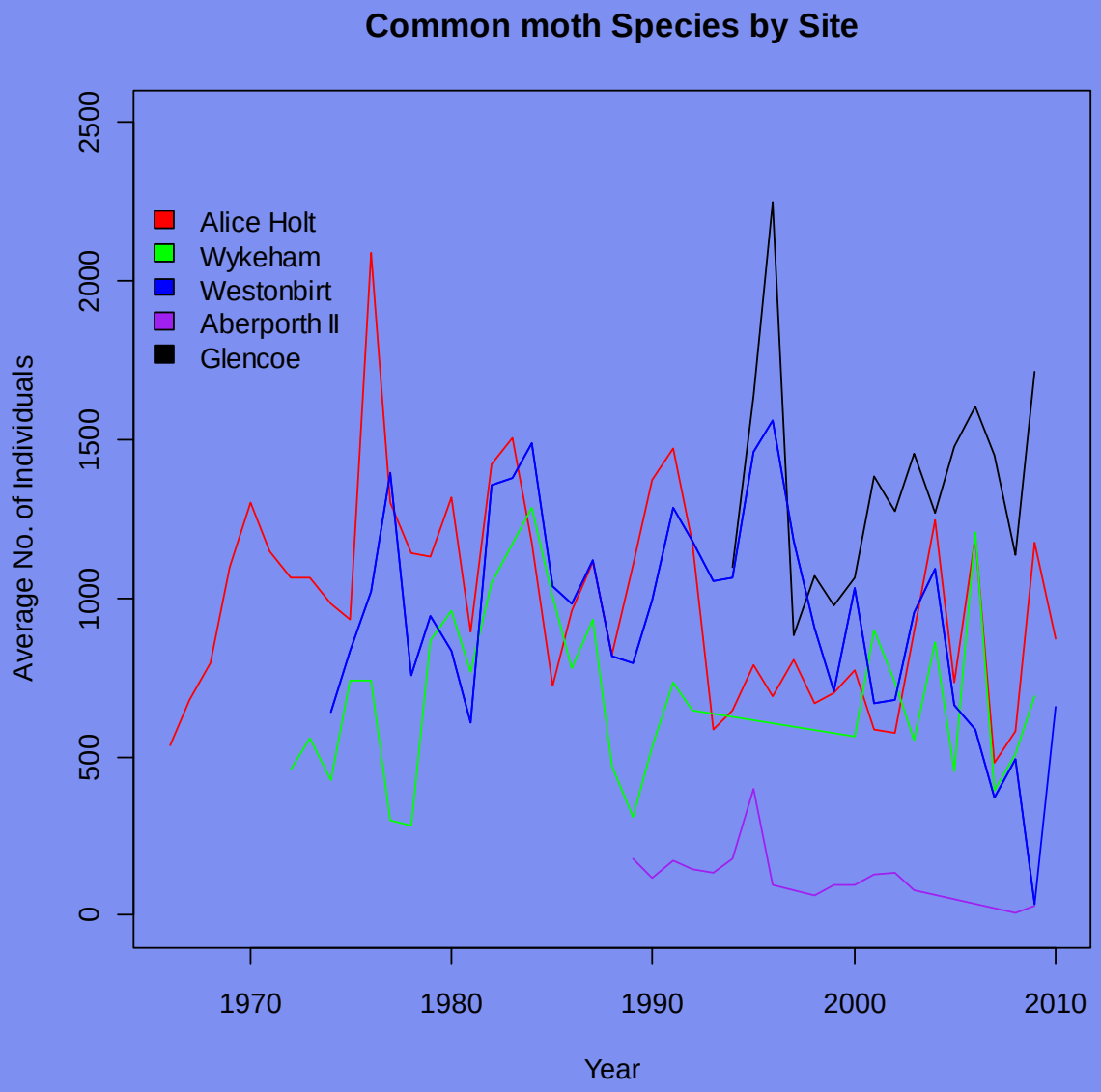
- Species associated with woodlands and trees
- Common species
- Local species
- Sites with long data runs
- Geographical spread

RIS Light traps

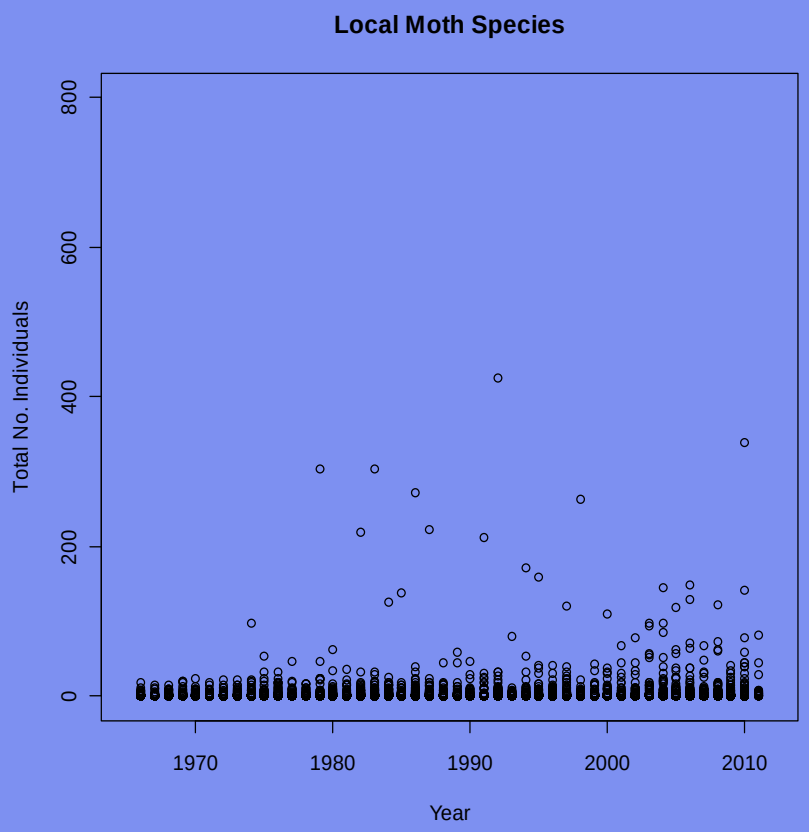


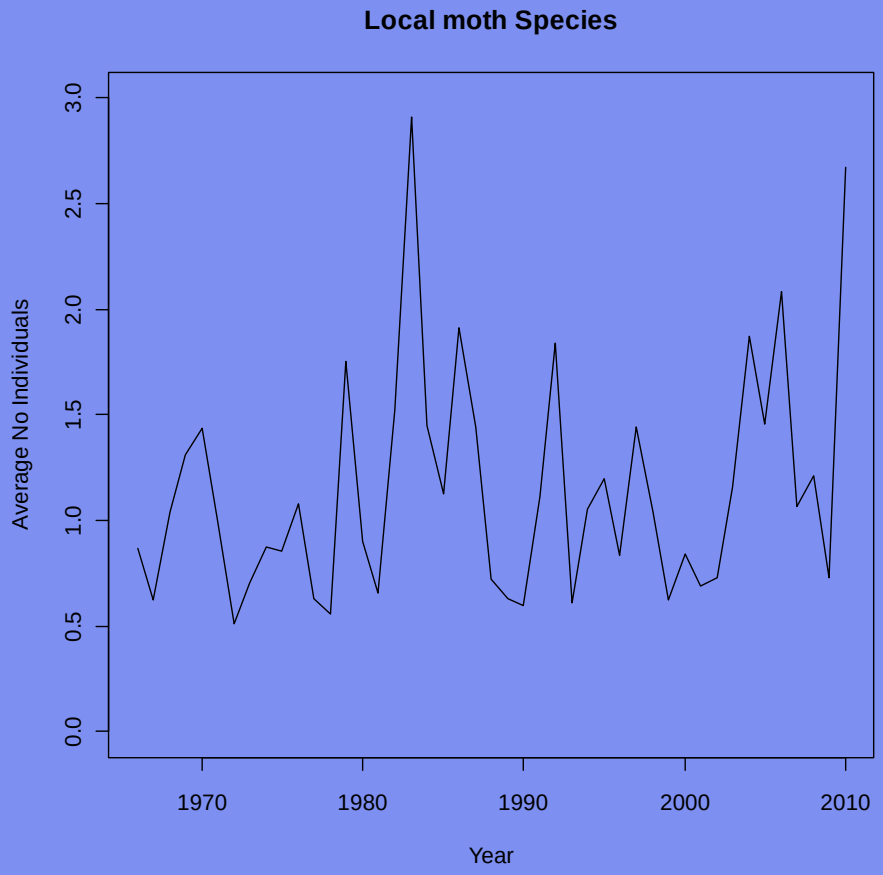


RIS Light traps

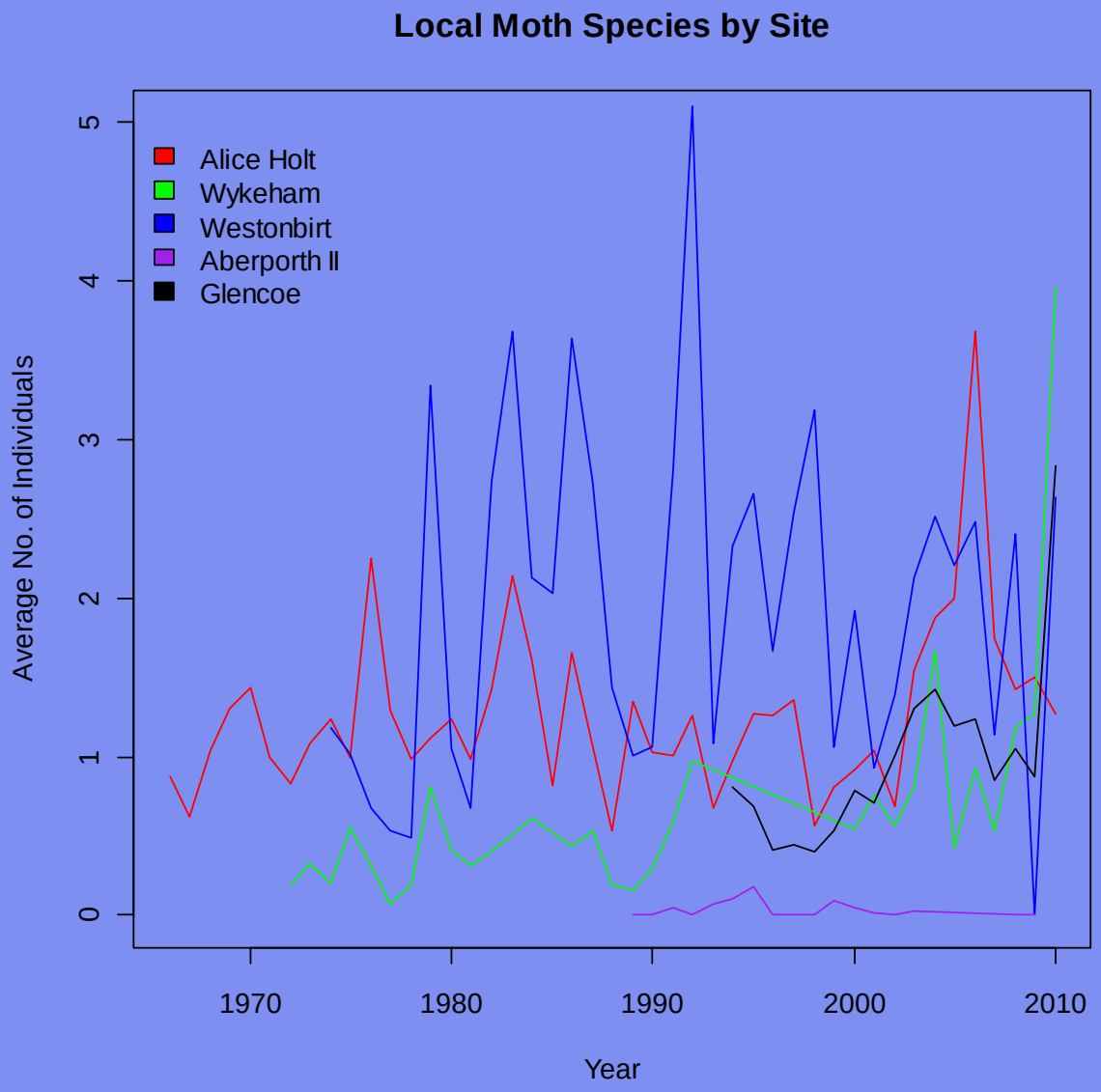


RIS Light Traps

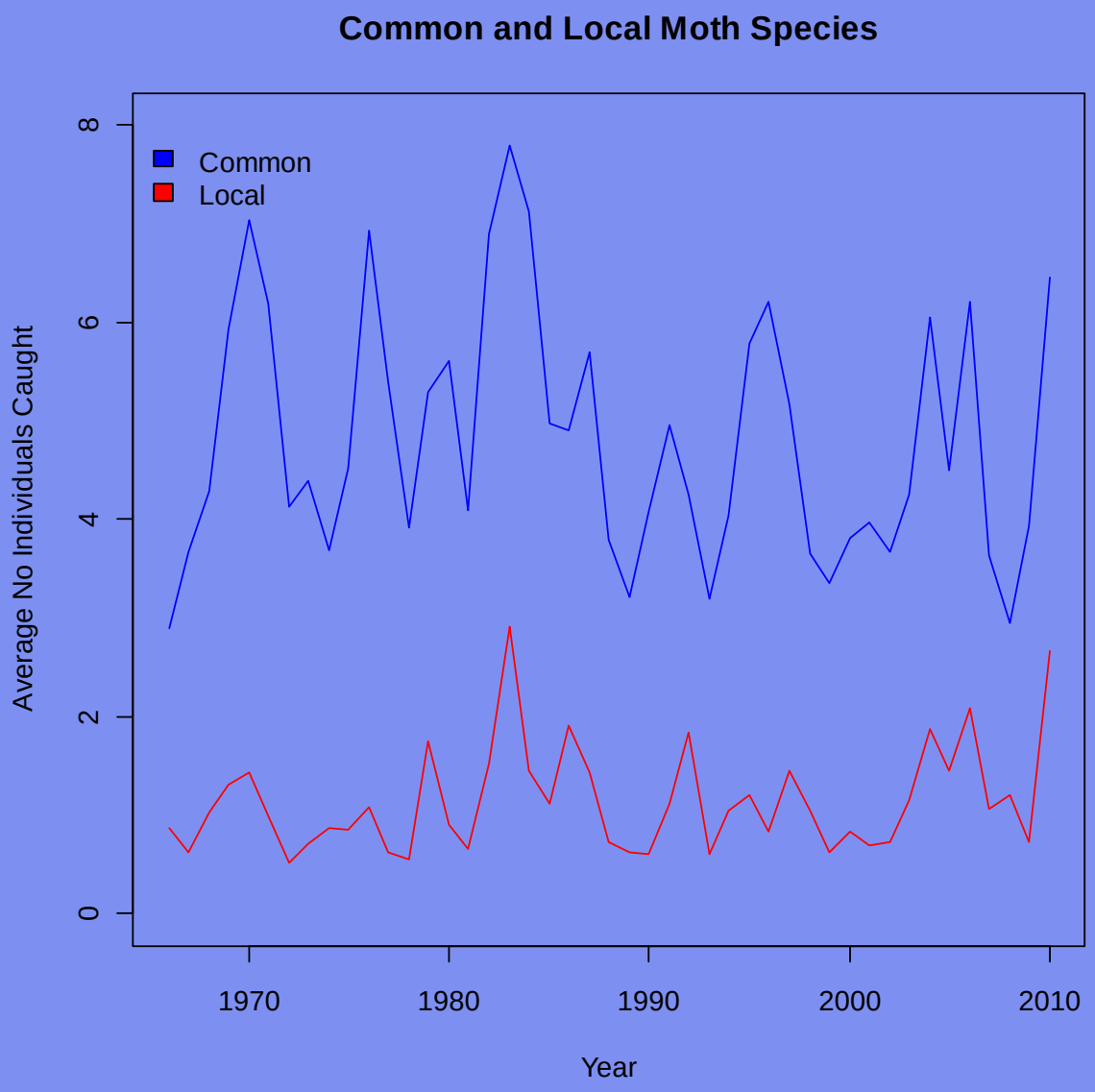




RIS Light Traps

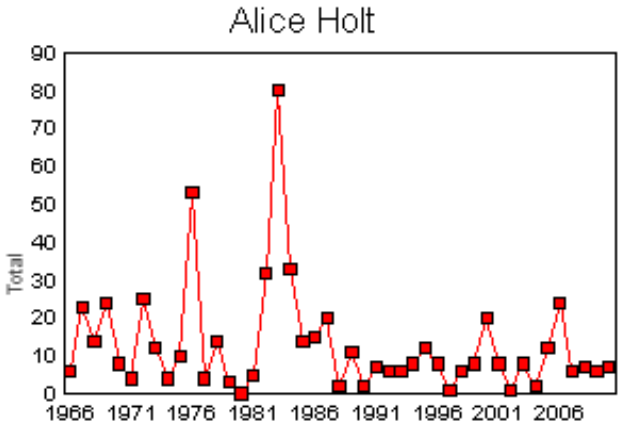


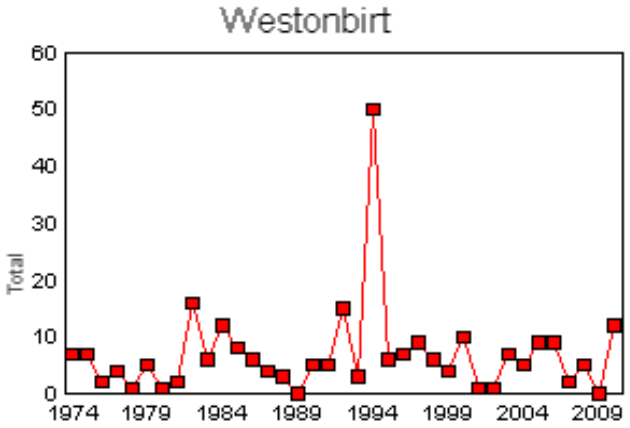
RIS Light traps – no change

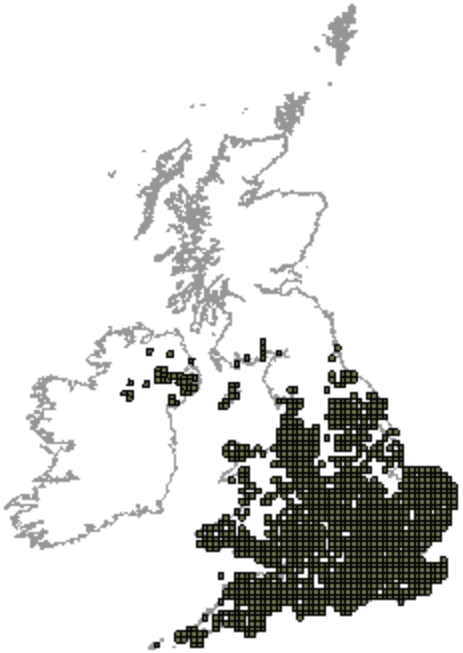


Common Emerald – *Hemithea aestivaria*

Blackthorn, hawthorn

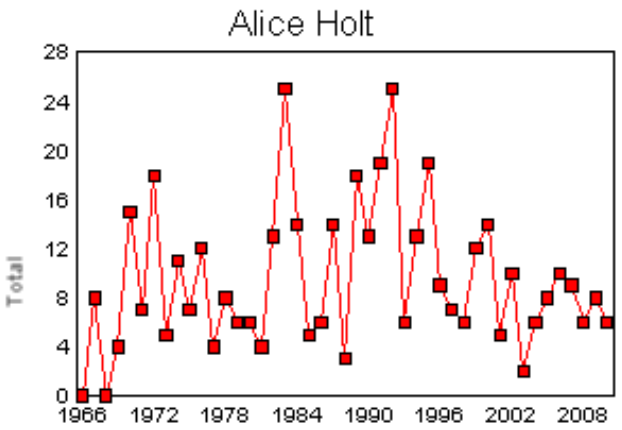


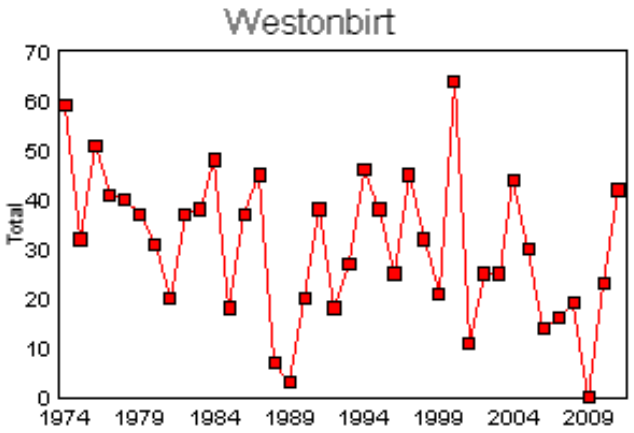


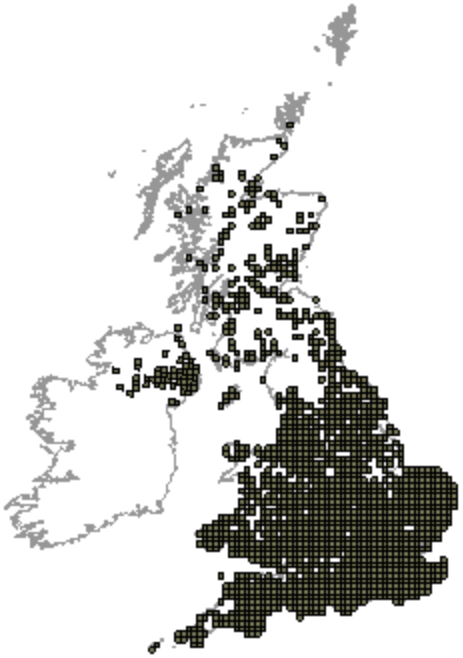


Willow beauty -*Peribatodes rhomboidaria*

Deciduous trees

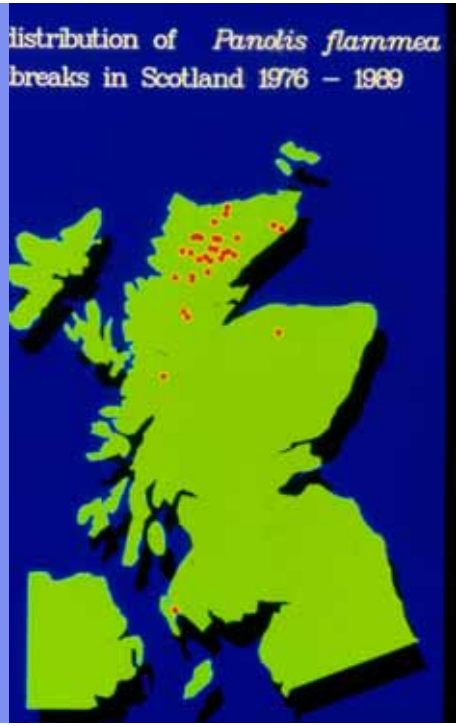


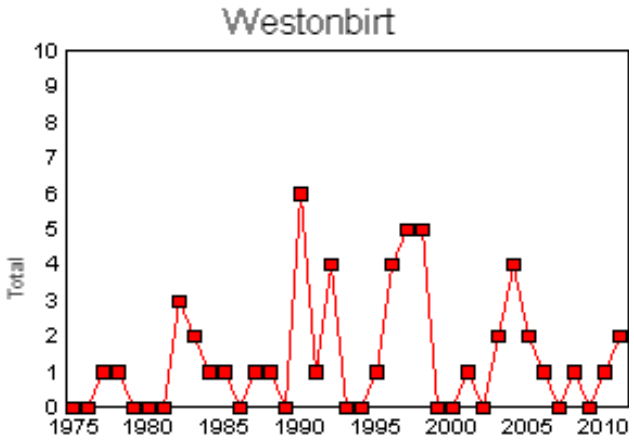


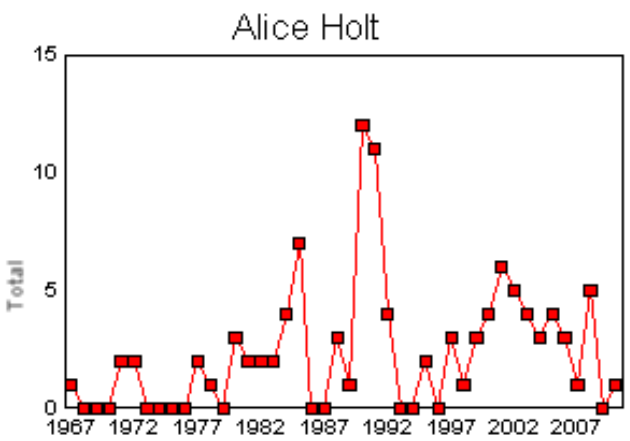


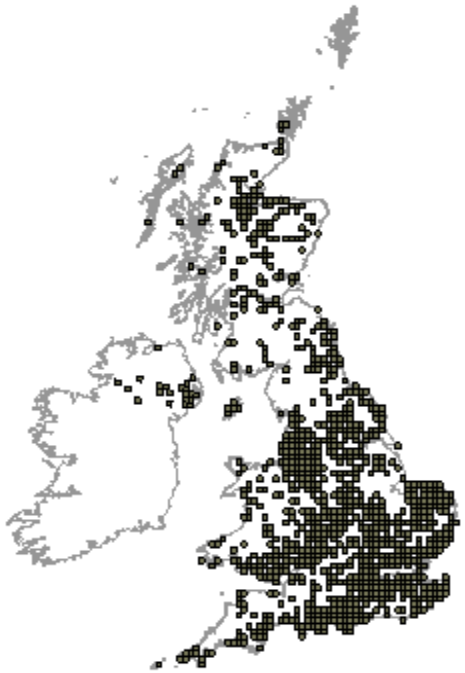
Pine beauty – *Panolis flammea*

Pinus species



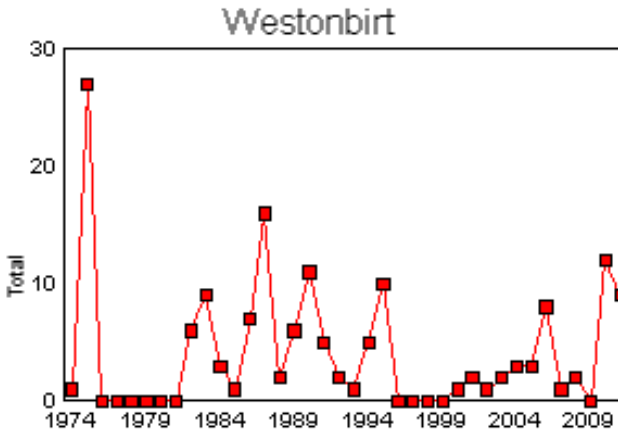


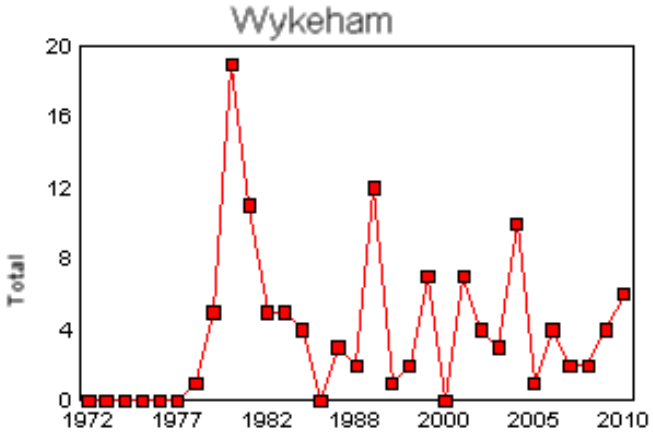


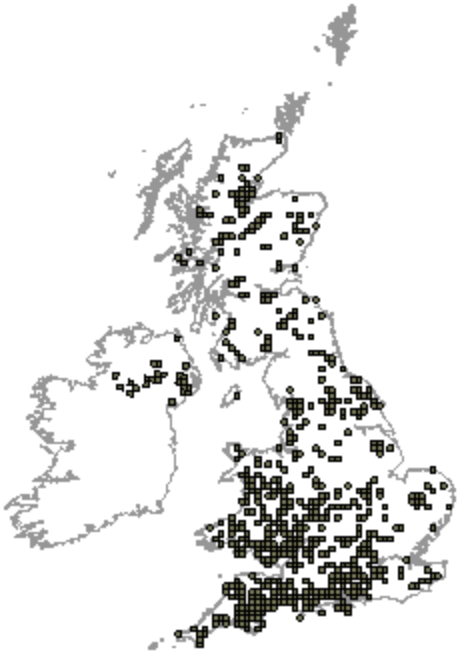


Satin beauty – *Deileptenia ribeata*

conifers

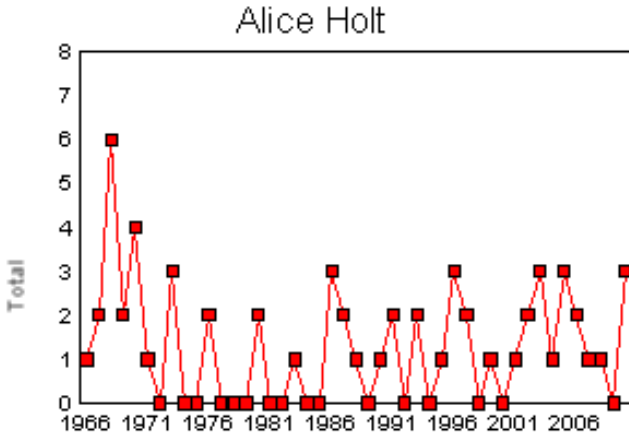


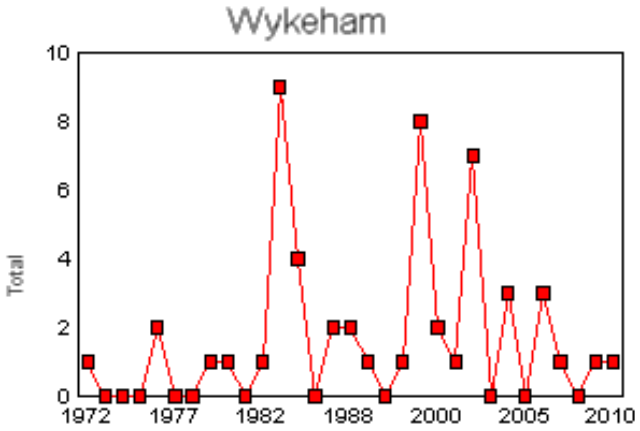


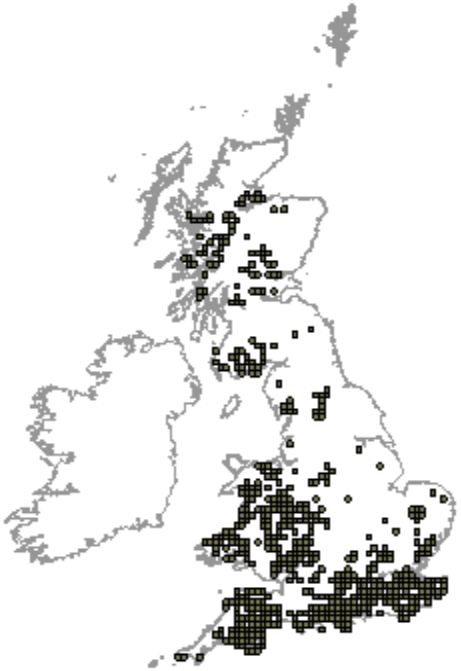


Speckled yellow – *Pseudopantheria macularia*

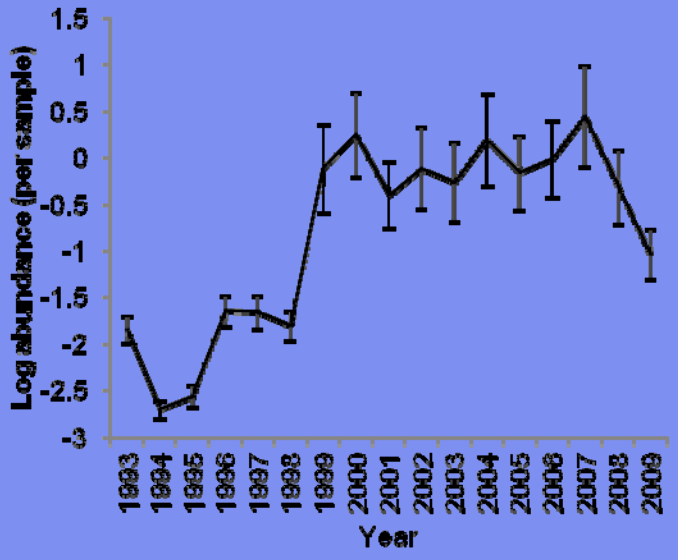
Wood sage



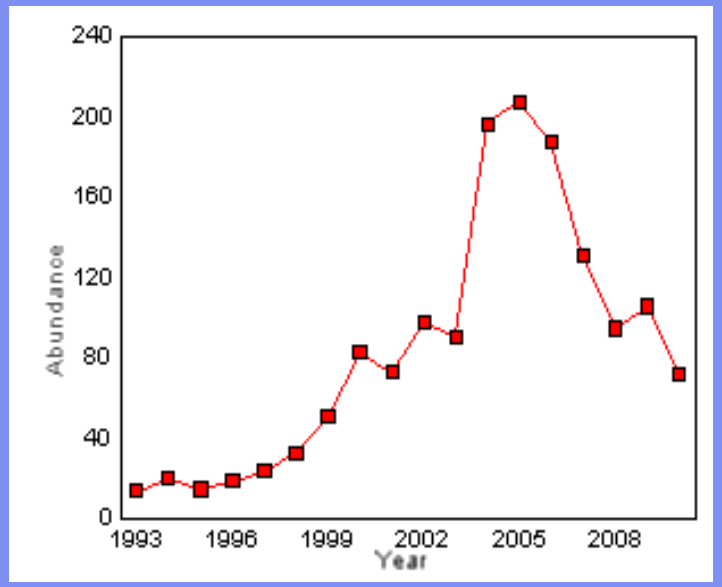




Orange ladybird



Silwood Park



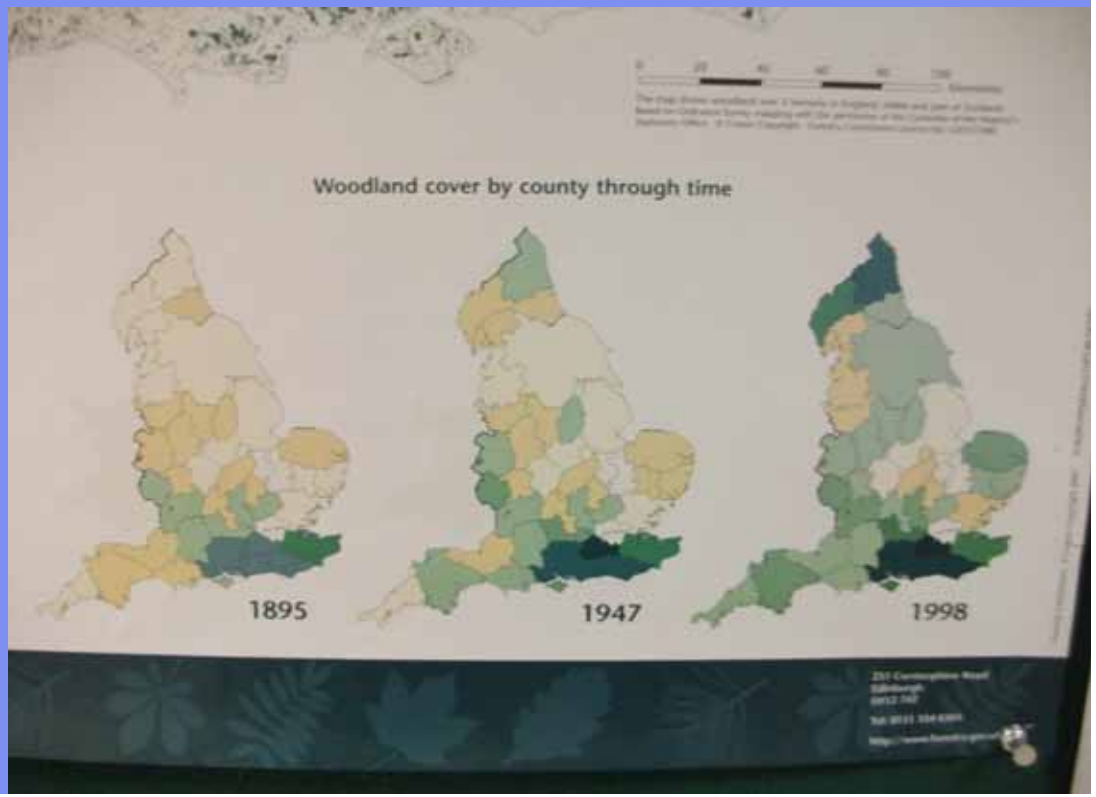
National ladybird survey

Summary

- Tree feeding aphids – no change or up
- Tree feeding moths – no change
- Associated insects – no change, down
- Invasive species – on the up

What has changed or is different about forests and woodlands?

- Very little insecticide use
  - Except restocking sites
  - Christmas tree growers
- More trees
  - More habitats
- Climate?



Many thanks to

- Nathan Brown
- Richard Harrington
- Fran Sconce
- Nigel Straw

Any questions?