

# Challenges and opportunities for recording well-loved species

Helen Roy and Peter Brown  
(and nearly 19 000 others)

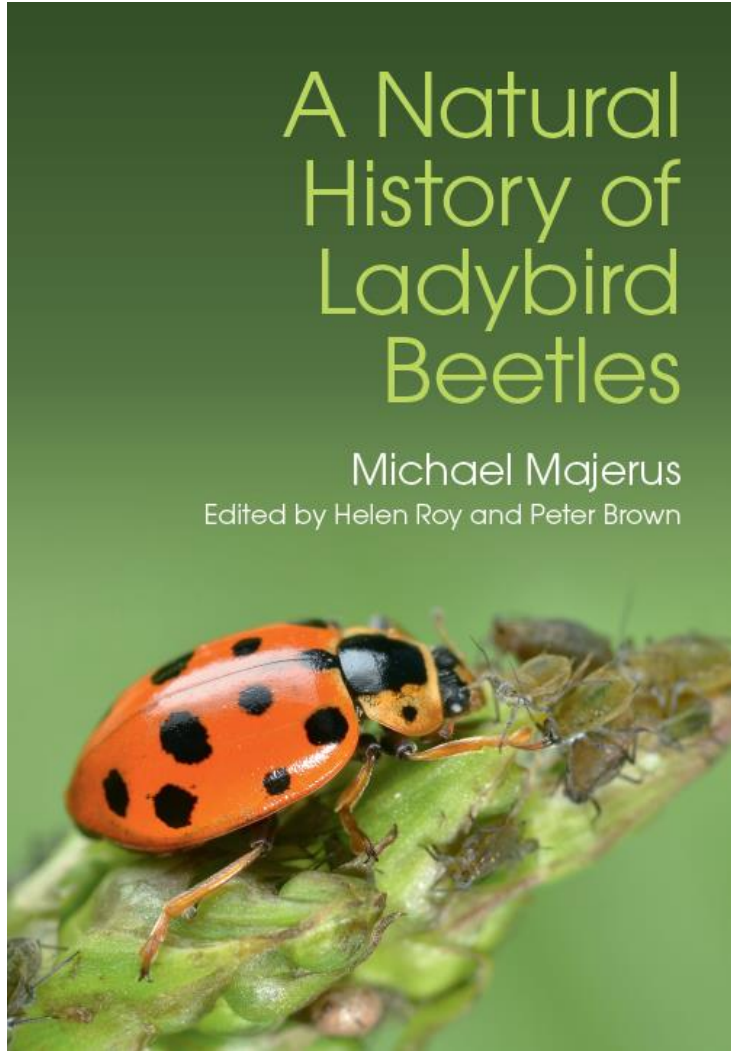
...a ladybird perspective



Jennifer Lewington



# Standing on shoulders

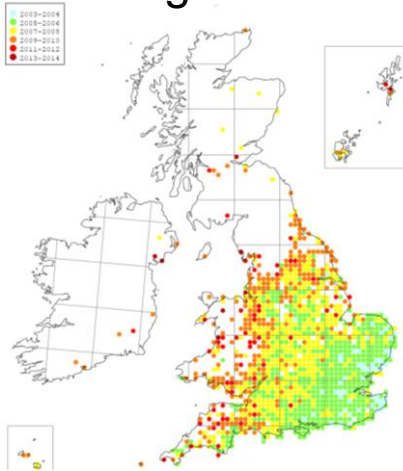


*A fascinating and most thorough treatise on the biology, folklore and scientific research of the world's Ladybirds. A wonderful legacy to the work of Mike Majerus.*

Richard Lewington (Wildlife Artist)

# The joy of recording well-loved species

Big data



Engaging



Inspiring



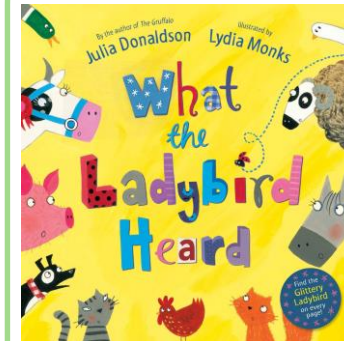
Fun



Captivating



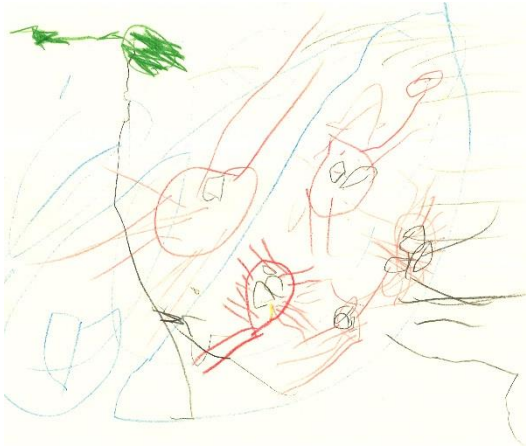
Creative



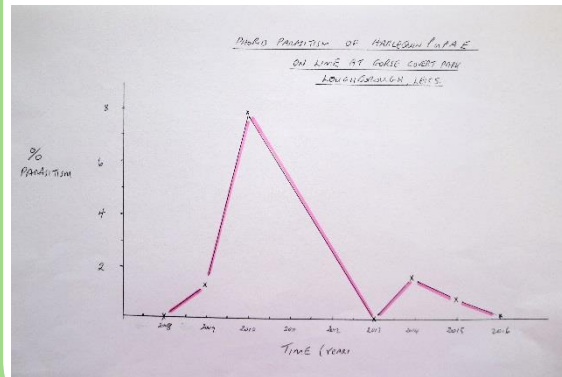


# ...collaborative

## Martha's Map



## Bill's Graph



## Imogen's Art



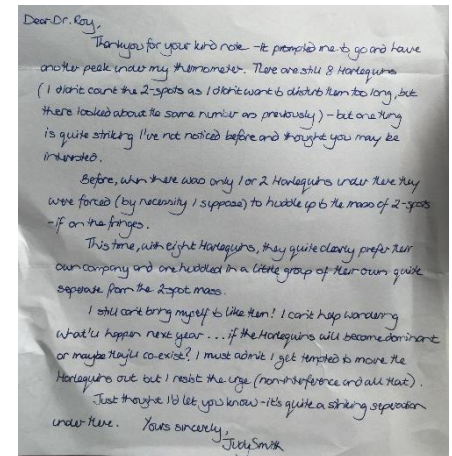
## Sheila's Blog



## Royal Mail Stamps




## Judy's Thermometer



<http://ballachurryreports.blogspot.co.uk/>

# Contributing records UK Ladybird Survey

# iRecord



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[Download](#)
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[Home](#) > [Enter ladybird records](#)

### Enter ladybird records

What did you see and where?

This records your enter using this form will be added to the [Enter ladybird records](#) group.

Please enter the date and all the species you saw at one site on a single day and any other information about them. Then move to the **Where was it?** tab before submitting your records.

Date:  


The day you saw this (24/06/2012)


Species	Colour form	Life stage	Quantity	Comment	Add photos
Select a species first		<input checked="" type="checkbox"/>			Select a species first





Use "\*" as a wildcard when searching for species names.

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[Terms & Conditions](#)
[Powered by !\[\]\(12a79dbbf604ba7c31ab212ea78f3d62\_img.jpg\)](#)

# Website



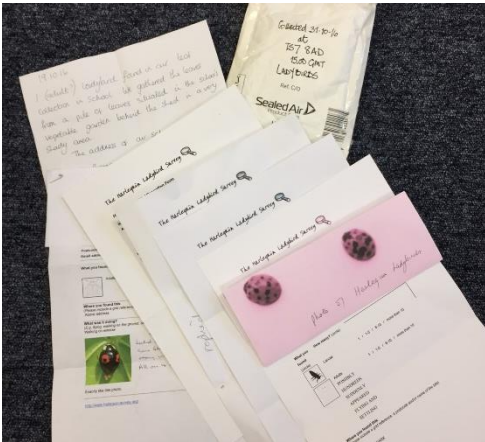



## Smartphone app



# Post



# Spreadsheets

[illegible]

## E-mails

**From:** John Powell  
**Sent:** 26 October 2016 13:14  
**To:** ladybird-survey  
**Subject:** Sighting

St. Annes on Sea, FY8. 1 adult in my garden on 29 June 2014. Sitting on the leaf of a potted plant as shown on the picture attached. Kindest regards, John



# Promotion of UK Ladybird Survey



**BBC** Sign in News Sport Weather iPlayer TV Radio

NEWS

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Science & Environment

We're being invaded - by ladybirds

31 October 2016 | Science & Environment

Share

34 | News

## Spot the difference: one ladybird is at risk, the other is a cannibal

THE TIMES Thursday February 7 2008



### Alien species

**Grey squirrel** Came to Britain from North America in 1876. Found in most of England and Wales and moving into Scotland. Larger than native reds and carries a virus which devastates the latter

**American signal crayfish** Native white-clawed crayfish are being eradicated by the larger, more aggressive American species, which also carries disease deadly to the native animal

**American mink** Brought here for their fur in 1929 but escaped into the wild where they have had a severe impact on water vole numbers — leading to a 90 per cent fall in the population

**Lewis Smith** Environment Reporter

An insect that once held promise as a natural pest controller was branded the most invasive species in Britain yesterday by researchers.

The harlequin ladybird has taken just four years to spread across England and to make inroads into Scotland and Wales, a feat that took the grey squirrel a century to achieve.

Since 2005 more than 20,000 sightings have been recorded of the ladybird, which threatens to take over from many of the 46 native British species of ladybird.

Its progress has been tracked by the Harlequin Ladybird Survey, an online survey overseen by the Centre for Ecology and Hydrology. Thousands of members of the public took part and it was funded in part by the Government.

Peter Brown, of the centre, said: "It's the most invasive species in Britain. It is perhaps equalled by the horse chestnut leaf-miner but nothing else comes close."

Harlequin ladybirds, *Harmonia axyridis*, were first identified in Britain in 2004 when one was seen in a pub garden in Sible Hadfield, Essex. Last month the species was reported in Orkney.

So serious is the problem that the

ladybird is the subject of a special issue of the journal *BioControl*. More than 50 scientists from Europe and North America contributed to the journal to share knowledge about its impact.

The horse chestnut leaf-miner is an insect first seen in south-west London in 2002. It has spread rapidly and now infests about 20 per cent of horse chestnut trees, causing leaf loss.

Helen Roy, who works at the centre and who edited the journal, said:

"Through this online survey we have been able to track its movements and are now beginning to understand more complex aspects of the ecology of the harlequin ladybird."

Because it eats so many aphids, its staple diet, as well as other ladybirds, it has threatened the number of native ladybirds and species, such as lacewings, which also eat aphids. It also threatens aphid numbers. The two-spot and seven-spot ladybirds are particularly threatened.

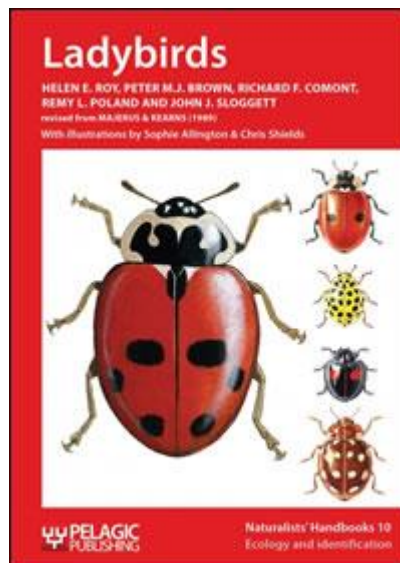
The harlequin ladybird's voracious appetite for aphids attracted interest in its use as a biological pest control but after it was released in several European countries in the 1980s and 1990s it rapidly became established and spread widely.

Mr Brown said: "Ladybirds are very popular but this one is a great concern in terms of his risk to biodiversity."



The invading harlequin, top left, is a threat to many natives

# Atlas, field guides and resources



**UK Ladybird Survey**

**Send a Ladybird Record!**

**UK Ladybirds**

- What is a ladybird?
- Anatomy
- Life cycle
- Species
- Habitat
- Enemies
- Monitoring

**BBC Breathing Places**

**Harlequin invasion**

**Recording**

**Research**

**Children's pages**

**Further information**

**Ladybird species in the UK**

There have been 3500 species of coccinellid described worldwide but until recently only 43 were considered as resident in Britain.

The herbivorous Bryony ladybird, *Epilachna argus*, and the small inconspicuous brown ladybird, *Rhyzobius chrysomeloides*, are recent additions but neither have attracted as much attention as the Harlequin ladybird, *H. axyridis*, first encountered in 2004.

Of the 46 ladybird species now found in Britain only 26 are readily recognisable as ladybirds and these are the focus of the Ladybird Survey.

A **ladybird identification sheet** (163Kb) and a ladybird **larvae identification sheet** (290Kb) are available in PDF format.

Thanks to Jeroen Mentens for supplying many excellent photos.

Sub-family	Species	Common name
Epilachninae	<i>Henosepilachna argus</i> (Geoffroy in Fourcroy)	Bryony ladybird
Epilachninae	<i>Subcoccinella 24-punctata</i> (L.)	24-spot ladybird
Coccinellinae	<i>Adalia 10-punctata</i> (L.)	10-spot ladybird
Coccinellinae	<i>Adalia 2-punctata</i> (L.)	2-spot ladybird
Coccinellinae	<i>Adonia variegata</i> (Goeze)	Adonis ladybird
Coccinellinae	<i>Anatis ocellata</i> (L.)	Eyed ladybird
Coccinellinae	<i>Anisosticta 19-punctata</i> (L.)	Water ladybird
Coccinellinae	<i>Aphidecta obliterata</i> (L.)	Larch ladybird
Coccinellinae	<i>Calvia 14-guttata</i> (L.)	Cream-spot ladybird
Coccinellinae	<i>Coccinella 11-punctata</i> L.	11-spot ladybird
Coccinellinae	<i>Coccinella 5-punctata</i> L.	5-spot ladybird
Coccinellinae	<i>Coccinella 7-punctata</i> L.	7-spot ladybird
Coccinellinae	<i>Coccinella hieroglyphica</i> L.	Hieroglyphic ladybird
Coccinellinae	<i>Coccinella magnifica</i> Redtenbacher	Scarce 7-spot ladybird
Coccinellinae	<i>Halysia 16-guttata</i> (L.)	Orange ladybird
Coccinellinae	<i>Harmonia 4-punctata</i> Pontoppidan	Cream-streaked ladybird
Coccinellinae	<i>Harmonia axyridis</i> (Pallas)	Harlequin ladybird
Coccinellinae	<i>Hippodamia 13-punctata</i> (L.)	13-spot ladybird
Coccinellinae	<i>Myrrha 18-guttata</i> (L.)	18-spot ladybird

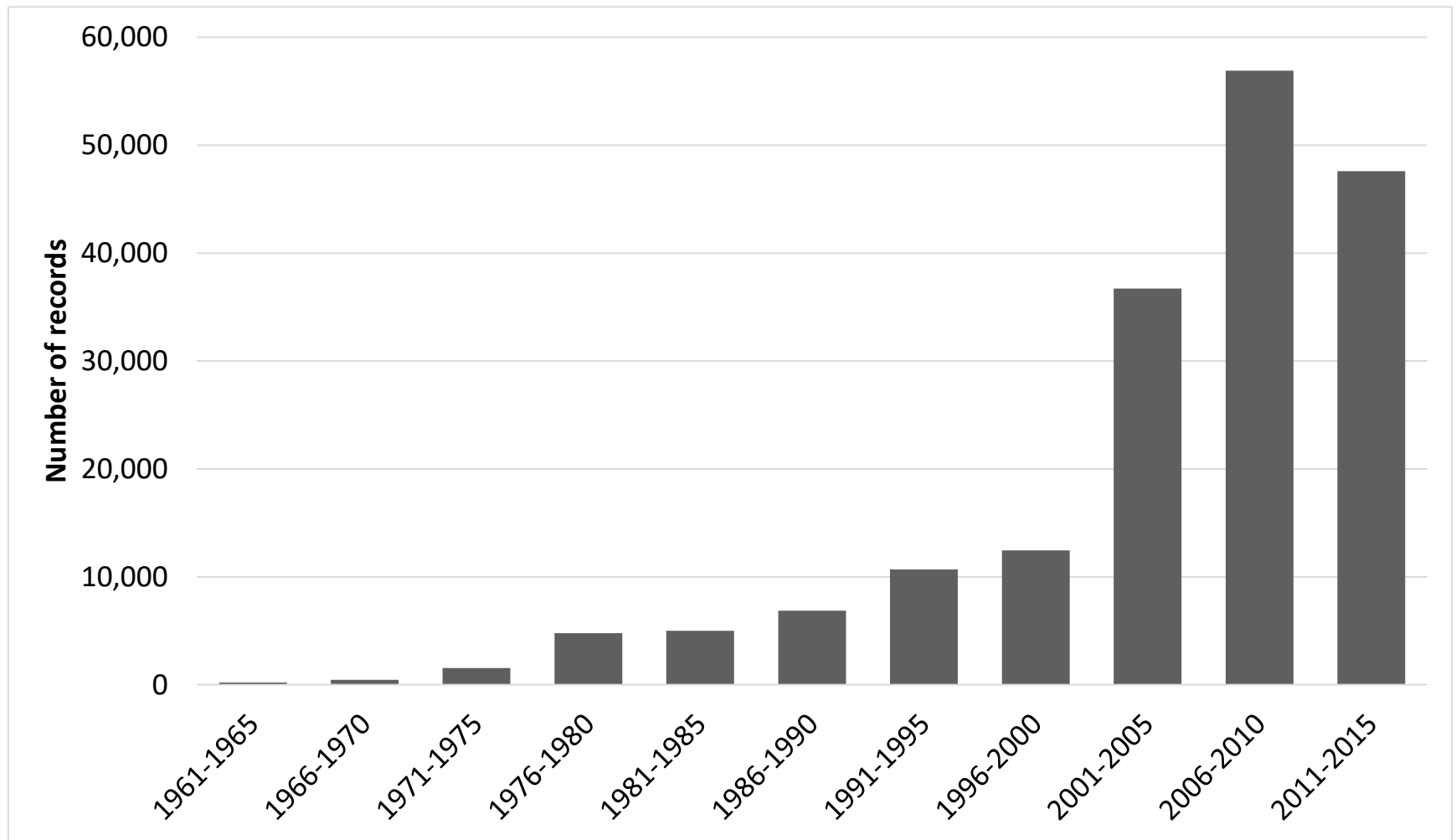




201 972 = total number of ladybird records  
(188 397 = verified)

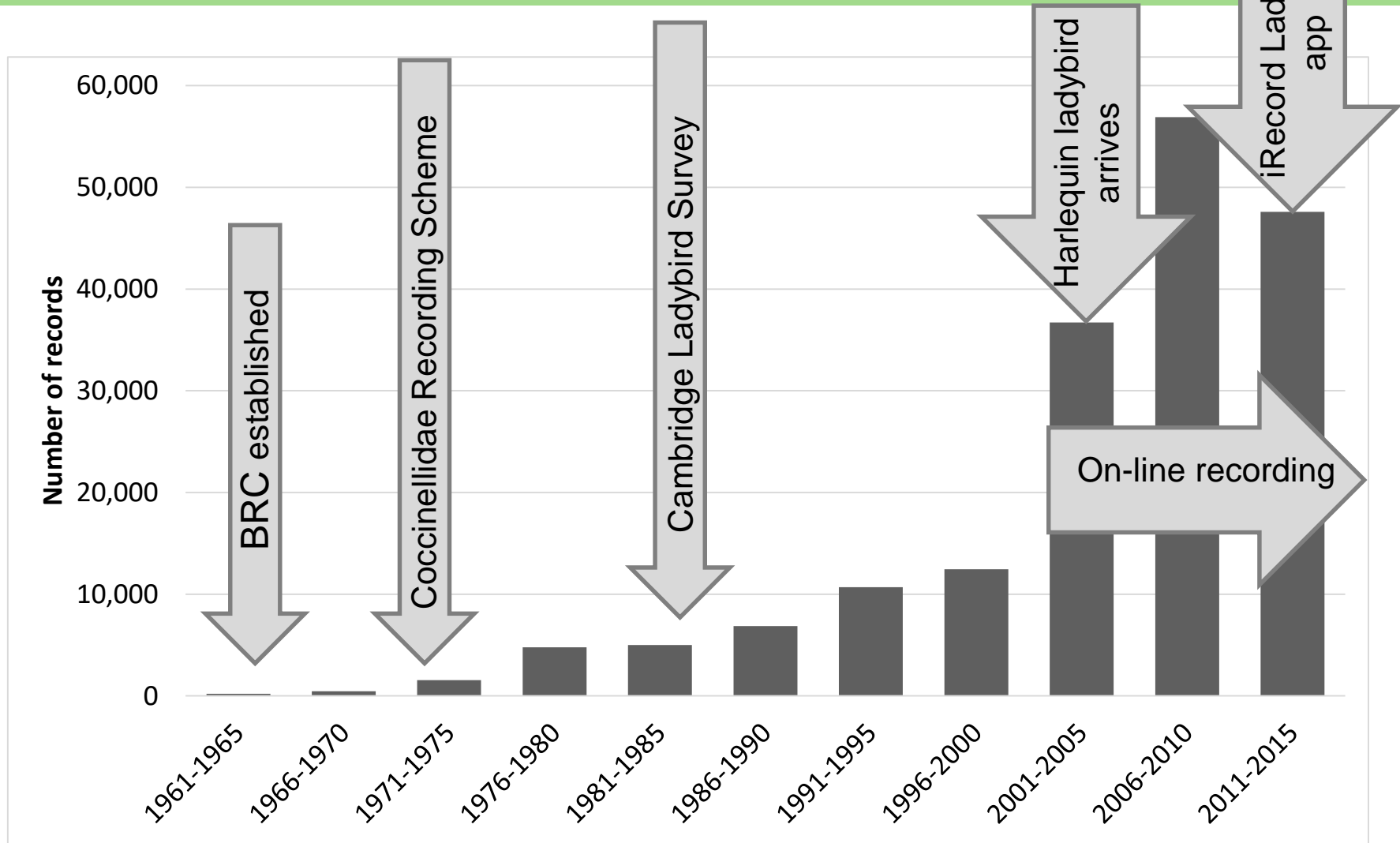


# Records over time





# Records over time

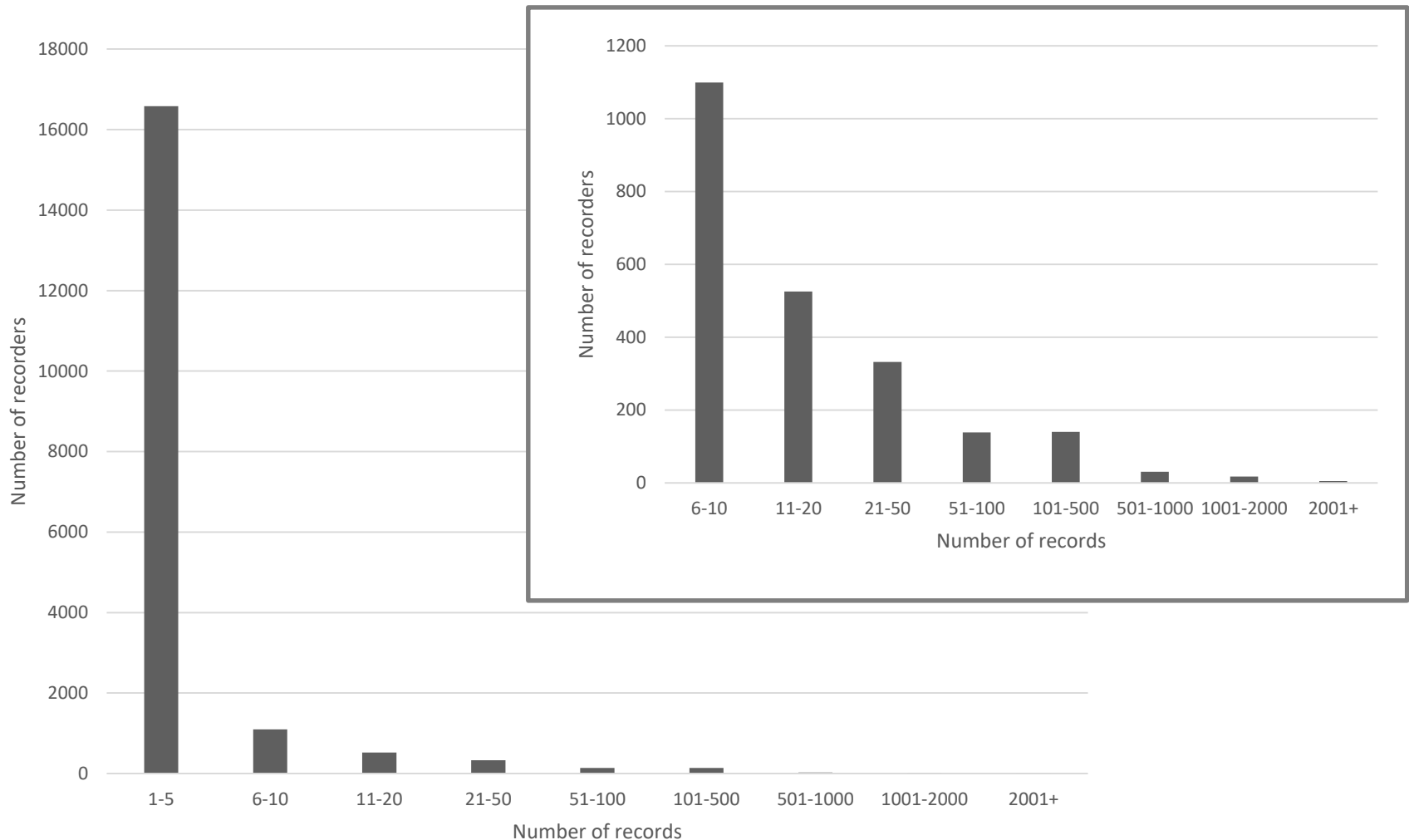


18 870 recorders





# Many recorders submit only a few records



# Many publications

Biol Invasions  
DOI 10.1007/s10530-013-0628-3

ORIGINAL PAPER

## Ecological correlates of local extinction and colonisation in the British ladybird beetles (Coleoptera: Coccinellidae)

Richard F. Comont · Helen E. Roy ·  
Richard Harrington · Christopher R. Shortall ·  
Bethan V. Purse

Journal of Biogeography (J. Biogeogr.) (2014)

ORIGINAL  
ARTICLE

## Landscape and climate determine patterns of spread for all colour morphs of the alien ladybird *Harmonia axyridis*

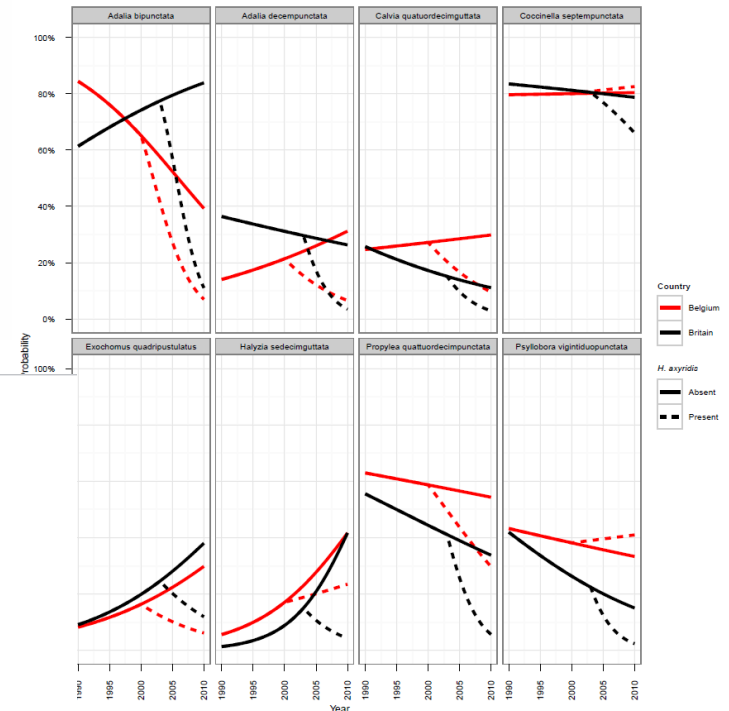
Bethan V. Purse<sup>1\*</sup>, Richard Comont<sup>1</sup>, Adam Butler<sup>2</sup>, Peter M. J. Brown<sup>3</sup>,  
Clare Kessel<sup>4</sup> and Helen E. Roy<sup>1</sup>

OPEN ACCESS Freely available online

## Characteristics and Drivers of High-Altitude Ladybird Flight: Insights from Vertical-Looking Entomological Radar

Daniel L. Jeffries<sup>1</sup>, Jason Chapman<sup>2,3</sup>, Helen E. Roy<sup>4</sup>, Stuart Humphries<sup>1</sup>, Richard Harrington<sup>2</sup>,  
Peter M. J. Brown<sup>5</sup>, Lori-J. Lawson Handley<sup>1\*</sup>

<sup>1</sup>Department of Biological Sciences, University of Hull, Hull, Humberside, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, Hertfordshire, United Kingdom, <sup>3</sup>Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall, United Kingdom, <sup>4</sup>NERC Centre for Ecology & Hydrology, Wallingford, Oxfordshire United Kingdom, <sup>5</sup>Department of Life Sciences, Anglia Ruskin University, Cambridge, United Kingdom



PLOS ONE

Ecological Entomology

Ecological Entomology (2015), 40, 336–348

DOI: 10.1111/een.12203

INVITED REVIEW

## Ten years of invasion: *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in Britain

HELENE E. ROY<sup>1</sup> and PETER M. J. BROWN<sup>2</sup> <sup>1</sup>Centre for Ecology & Hydrology, Oxfordshire, U.K. and <sup>2</sup>Animal and Environment Research Group, Life Sciences Department, Anglia Ruskin University, Cambridge, U.K.



# Ten years of invasion in Britain

**Table 1.** Predictions following the arrival of *Harmonia axyridis* in Britain (Majerus *et al.*, 2006) alongside a summary of recent evidence, supporting references, and overall conclusions, based on current understanding, with respect to the importance of factors in determining success of invasion by this species.

Prediction	Evidence	References	Conclusion
Eurytopic nature of <i>H. axyridis</i> will contribute to rapid spread	The range of host plant associations and widespread distribution of <i>H. axyridis</i> in Britain reflect the eurytopic nature of this species, although coniferous woodlands may negatively affect the spread of <i>H. axyridis</i> . Habitat breadth is an important factor contributing to the invasion success of <i>H. axyridis</i> .	Brown <i>et al.</i> (2008b, 2011a)	+
Climatic adaptability of <i>H. axyridis</i> will give it a competitive advantage over some of the more niche-specific native ladybirds	Climatic conditions have not been a barrier to the colonisation and spread of <i>H. axyridis</i> in southern Britain, but are speculated to have limited its abundance in northern England and in Scotland. There are clear discrepancies between the observed and predicted (climate model) distributions of <i>H. axyridis</i> , and it is apparent that climate is an important factor in determining the spread of this species but alongside other interacting biotic and abiotic factors.	Comont <i>et al.</i> (2012) and Purse <i>et al.</i> (2014)	+/?
Maritime climate of Britain will allow <i>H. axyridis</i> to breed throughout the summer, with no requirement for a summer dormancy	Continual breeding of this species is apparent and at least two generations of <i>H. axyridis</i> have been observed each year since arrival. Multivoltinism contributes to the rapid rate of population growth of <i>H. axyridis</i> each year and, consequently, to spread.	Brown <i>et al.</i> (2008b) and Roy <i>et al.</i> (2011a)	+
Phenotypic plasticity will allow <i>H. axyridis</i> to successfully and regularly extend its breeding season to September, October, and even into November	Phenotypic plasticity displayed by <i>H. axyridis</i> enables local adaptation at temporal and spatial scales; increase in autumnal melanisation may have accelerated the spread of <i>H. axyridis</i> . Further work is required to elucidate the importance of phenotypic plasticity in the invasion success of <i>H. axyridis</i> .	Michie <i>et al.</i> (2010) and Purse <i>et al.</i> (2014)	?
<i>H. axyridis</i> will spread across the entire British mainland by 2008	The first record of <i>H. axyridis</i> in Scotland was in 2007. However, there are relatively few records in Scotland and its distribution and breeding there are limited. High dispersal ability of this species has clearly been demonstrated in most of England and Wales.	Brown <i>et al.</i> (2008a, 2008b, 2011b) and Roy <i>et al.</i> (2011a)	+
Spread and increase of <i>H. axyridis</i> in Britain may therefore prove to be beneficial to crop systems by restricting aphid numbers below economically damaging levels and so reduce the use of chemical pesticides	Recent research highlights the importance of <i>H. axyridis</i> as an aphid predator in crop systems in the UK. Further work is required to explore the ecosystem-level impact of <i>H. axyridis</i> on pest insects and particularly the ecosystem service provided by this alien predator.	Wells (2011)	?
<i>Harmonia axyridis</i> is likely to have a negative effect on other aphidophages in three ways: resource competition, intra-guild predation, and intraspecific competition	There is considerable evidence of intra-guild predation from laboratory and field observations. Observations from the UK Ladybird presence of <i>H. axyridis</i> and decline of other aphidophages. Further work is required on competition in mesocosms suggests that high aphid densities have negative effects on ecosystem function. A few studies indicate the importance of interactions. The importance of chemical defence of <i>H. axyridis</i> over native species. There have been many reports of <i>H. axyridis</i> attacking native ladybirds. There is some evidence of negative effects on other aphidophages.	Ware and Majerus (2008), Ware <i>et al.</i> (2009), Wells <i>et al.</i> (2011)	+
Efficient chemical defence and relatively large size would provide <i>H. axyridis</i> with a significant reproductive advantage over many native British species			
<i>H. axyridis</i> will become a nuisance to humans			

+, important factor; -, unimportant; ?, undecided.

## INVITED REVIEW

## Ten years of invasion: *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in Britain

HELEN E. ROY<sup>1</sup> and PETER M. J. BROWN<sup>2</sup> <sup>1</sup>Centre for Ecology & Hydrology, Oxfordshire, U.K. and <sup>2</sup>Animal and Environment Research Group, Life Sciences Department, Anglia Ruskin University, Cambridge, U.K.

# Going global...

Diversity and Distributions, (Diversity Distrib.) (2016) 22, 982–994



## Rapid spread of *Harmonia axyridis* in Chile and its effects on local coccinellid biodiversity

Audrey A. Grez<sup>1\*</sup>, Tania Zaviezo<sup>2</sup>, Helen E. Roy<sup>3</sup>, Peter M. J. Brown<sup>4</sup> and Gustavo Bizama<sup>5</sup>



Insect Conservation and Diversity (2016) 9, 202–209

doi: 10.1111/icad.12158

## Long-term changes in communities of native coccinellids: population fluctuations and the effect of competition from an invasive non-native species

ALOIS HONEK,<sup>1</sup> ZDENKA MARTINKOVA,<sup>1</sup> ANTHONY F.G. DIXON,<sup>2</sup> HELEN E. ROY<sup>3</sup> and STANO PEKÁR<sup>4</sup>

<sup>1</sup>Crop Research Institute, Prague, Czech Republic, <sup>2</sup>Department of Biodiversity Research, Global Change Research Centre AS CR, Brno, Czech Republic, <sup>3</sup>NERC Centre for Ecology & Hydrology, Wallingford, UK and <sup>4</sup>Department of Botany and Zoology, Faculty of Sciences, Masaryk University, Brno, Czech Republic

### RESEARCH COMMUNICATIONS

## Lessons from lady beetles: accuracy of monitoring data from US and UK citizen-science programs

Mary M Gardiner<sup>1\*</sup>, Leslie L Allee<sup>2</sup>, Peter MJ Brown<sup>3</sup>, John E Losey<sup>2</sup>, Helen E Roy<sup>4</sup>, and Rebecca Rice Smyth<sup>2</sup>

Citizen scientists have the potential to play a crucial role in the study of rapidly changing lady beetle (Coccinellidae) populations. We used data derived from three coccinellid-focused citizen-science programs to examine the costs and benefits of data collection from direct citizen-science (data used without verification) and verified citizen-science (observations verified by trained experts) programs. Data collated through direct citizen science overestimated species richness and diversity values in comparison to verified data, thereby influencing interpretation. The use of citizen scientists to collect data also influenced research costs; our analysis shows that verified citizen science was more cost effective than traditional science (in terms of data gathered per dollar). The ability to collect a greater number of samples through direct citizen science may compensate for reduced accuracy, depending on the type of data collected and the type(s) and extent of errors committed by volunteers.

Front Ecol Environ 2012; doi:10.1890/110185

Biol Invasions  
DOI 10.1007/s10530-016-1077-6



INSECT INVASIONS

## The harlequin ladybird, *Harmonia axyridis*: global perspectives on invasion history and ecology

Helen E. Roy · Peter M. J. Brown · Tim Adriaens · Nick Berkvens · Isabel Borges · Susana Clusella-Trullas · Richard F. Comont · Patrick De Clercq · Rene Eschen · Arnaud Estoup · Edward W. Evans · Benoit Facon · Mary M. Gardiner · Artur Gil · Audrey A. Grez · Thomas Guillemaud · Danny Haelewaters · Annette Herz · Alois Honek · Andy G. Howe · Cang Hui · William D. Hutchison · Marc Kenis · Robert L. Koch · Jan Kulfan · Lori Lawson Handley · Eric Lombaert · Antoon Loomans · John Losey · Alexander O. Lukashuk · Dirk Maes · Alexandra Magro · Katie M. Murray · Gilles San Martin · Zdenka Martinkova · Ingrid A. Minnaar · Oldřich Nedved · Marina J. Orlova-Bienkowskaja · Naoya Osawa · Wolfgang Rabitsch · Hans Peter Ravn · Gabriele Rondoni · Steph L. Rorke · Sergey K. Ryndevich · May-Guri Saethre · John J. Sloggett · Antonio Onofre Soares · Riaan Stals · Matthew C. Tinsley · Axel Vandereycken · Paul van Wierink · Sandra Vigišová · Peter Zach · Ilya A. Zakharov · Tania Zaviezo · Zihua Zhao

Received: 11 July 2015 / Accepted: 3 November 2015  
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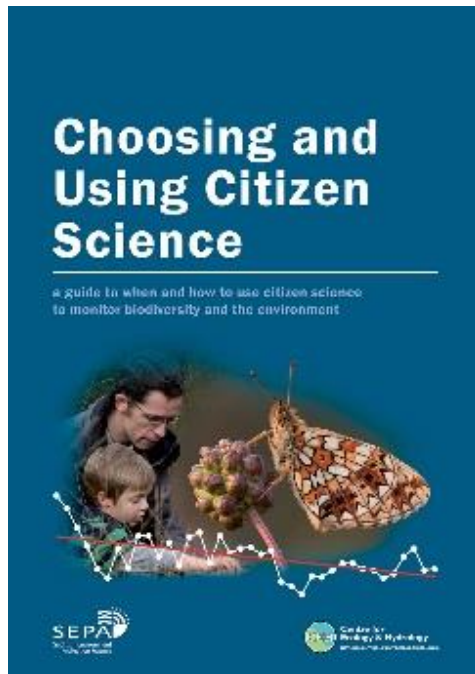
# Informing non-native species alerts



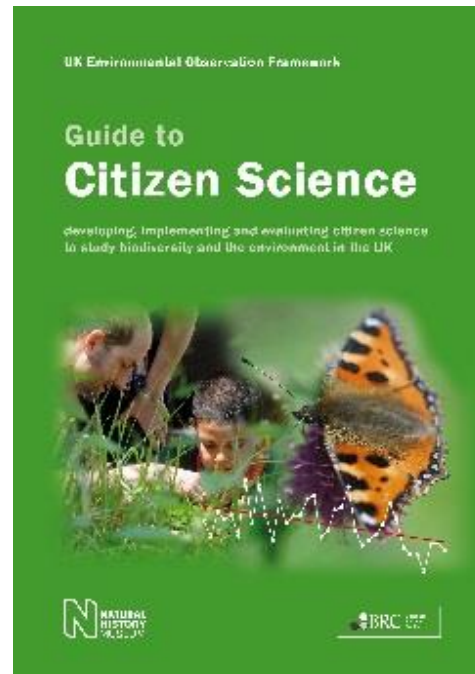


# Lessons learnt beyond the ladybirds...

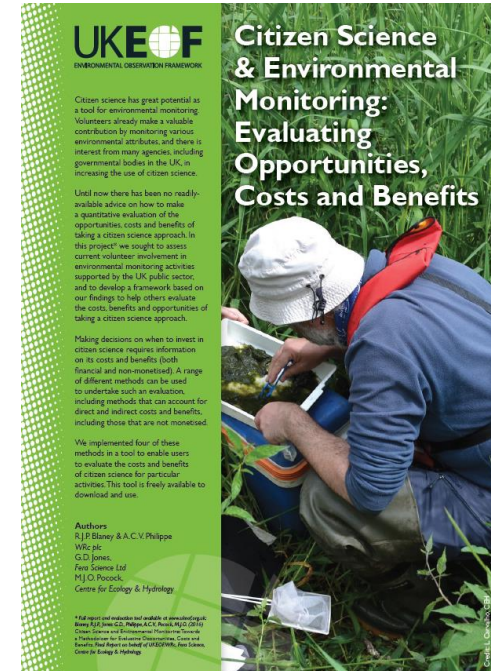
How to choose  
citizen science  
approaches



How to run citizen  
science well



Evaluating cost-  
benefits of citizen  
science





# Challenges

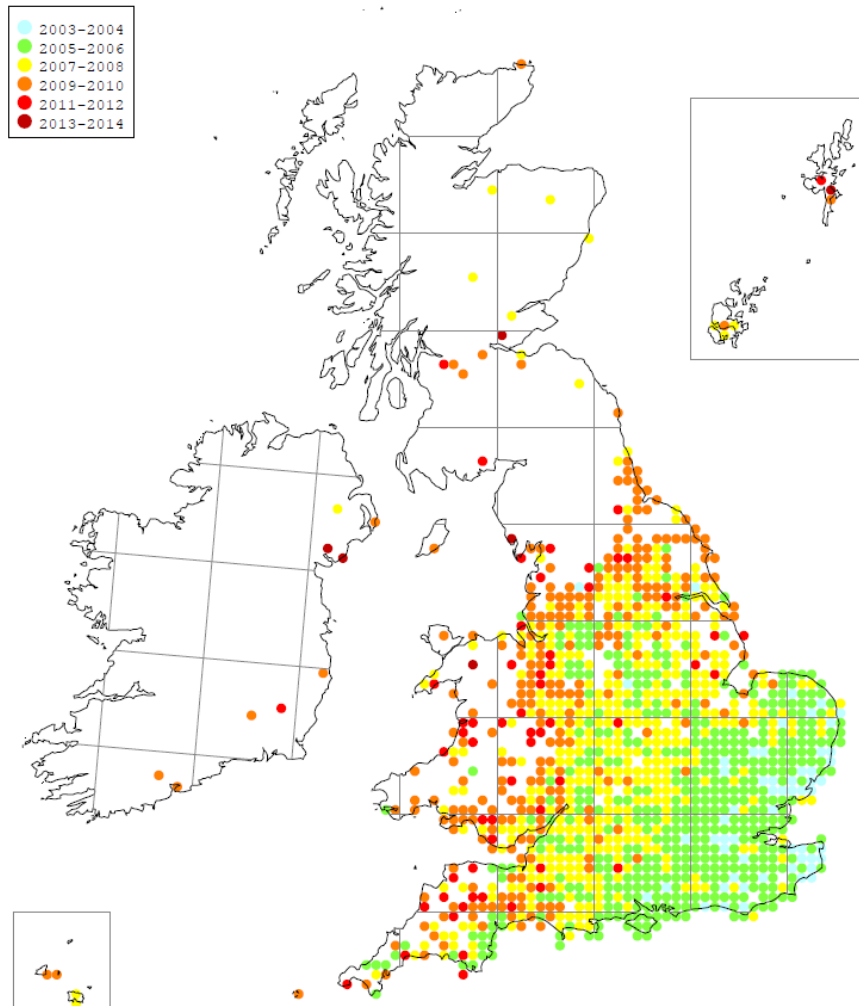


13 565 = unverified ladybirds records





# 48 726 (26%) = verified harlequin records



# Many potentially under-recorded species



**NBN Gateway** Search the NBN Gateway Go

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You are here: [Data](#) > [Invertebrates](#) > [Coleoptera](#) > Grid Map

### Grid map for *Scymnus (Scymnus) interruptus* (Goeze, 1777)

**Controls**

Resolution—  
Resolution of squares displayed: 10km

Zoom to area  
Region: GB and Ireland  
Vice county: None

Date ranges and colours—  
Date 1 (i) from 1600 to 2016 (bottom)  
Date 2 (ii) from 1600 to 2016 (middle)  
Date 3 (iii) from 1600 to 2016 (top)  
Show outline: ☒ Outline colour: Black

Overlays and backgrounds—  
☒ Coastline ☐ 100km grid  
☐ Ordnance survey ☐ 10km grid  
☐ Vice counties

Download—  
 Download  
 Download Records

Other Options  
[View on interactive map](#)  
[Request better access](#)

**Map**

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You may not have full access to all the datasets relating to this species. Your current level of access can be identified in the list provided below. You are STRONGLY ADVISED to seek improved access by contacting the relevant datasets before using them, taking to account required improved access. These records that your use of these data complies with the [NBN Gateway Access Policy](#).

Data providers and their datasets that contribute to this page (number of records)		<a href="#">Select All</a>	<a href="#">Deselect All</a>
Sort by: Number of Records			
<b>Dataset title</b>	<b>Dataset access</b>		
<input checked="" type="checkbox"/> Biological Records Centre (113)			
<input checked="" type="checkbox"/> Ladybird Survey of the UK (2)	• Public access: records available at 10km		
<input checked="" type="checkbox"/> UK Ladybird Survey data from Records (6)	• Public access: records available at 100m with recorder names and attributes		
<input checked="" type="checkbox"/> Kent & Medway Biological Records Centre (6)			
<input checked="" type="checkbox"/> Coleoptera Records for Kent (5)	• Public access: records available at 10km		
<input checked="" type="checkbox"/> Greenspace Information for Greater London CIC (1)			
<input checked="" type="checkbox"/> Wildlife sightings for Greater London from miscellaneous sources, 1900s to present (1)	• Public access: records available at 1km		
<input checked="" type="checkbox"/> Natural England (1)			
<input checked="" type="checkbox"/> Invertebrate Common Standards Monitoring and UK Test Data (1)	• Public access: records available at 100m with recorder names and attributes		

**Datasets with relevant data that you do not have access to**

Dataset	Provider
Essex Field Club dataset for Environment Agency use only	Essex Biodiversity Record Centre
Essex county records held in the Essex Field Club and partners' databases, primarily modern 1900s to 2015	Essex Recorder's partnership Essex Biological Record Centre
Wildlife sightings for Greater London (for GLG partners), 1900s to present	Greenspace Information for Greater London CIC

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Developed for National Biodiversity Network by CEH and JNC



# Improving data flow



One UK Ladybird Survey week:

31<sup>st</sup> October 2016 –  
7 November 2016

907 records received within iRecord

(738 = *Harmonia axyridis*)

457 records verified

Last update to the NBN Gateway:

14 July 2016

# Data licensing, access and exchange...

Additional drivers for changing the data licenses options on the NBN Gateway are:

- to allow DEFRA network organisation to achieve Liz Truss' vision of open data (JNCC, EA, NE etc.)
- to ensure organisations in UK that want open data can use the NBN Gateway for that
- to streamline data sharing with GBIF
- to act on recommendations given at the NBN Gateway Terms and Conditions Workshop (November 2014)
- to provide for closer connectivity (webservicing etc) with [data.gov.uk](http://data.gov.uk)

## What changes have been made?

The following four license options are now available on the NBN Gateway:

- [Open Government License](#) (OGL)
- [Creative Commons Zero](#) (CC0)
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A new clause (2.8) has been added to the NBN Gateway Terms and Conditions to give these licenses legal effect. This new clause states that: "Datasets with a standard data license (OGL, CC-BY, CC-BY-NC, etc) are governed by the particulars of the data license. These licenses override sections 2 to 7 of the 'Use' section of the NBN Gateway Terms and Conditions."

Read the [NBN Gateway Terms and Conditions](#)

## How do I assign a data license?

There is no obligation to assign a data license to your datasets, though following the recent questionnaire on Improving Access to NBN Data and Products it is clear that there is an appetite

**Aim to have fully open access = Creative Commons Zero**



# ...charismatic beetles...



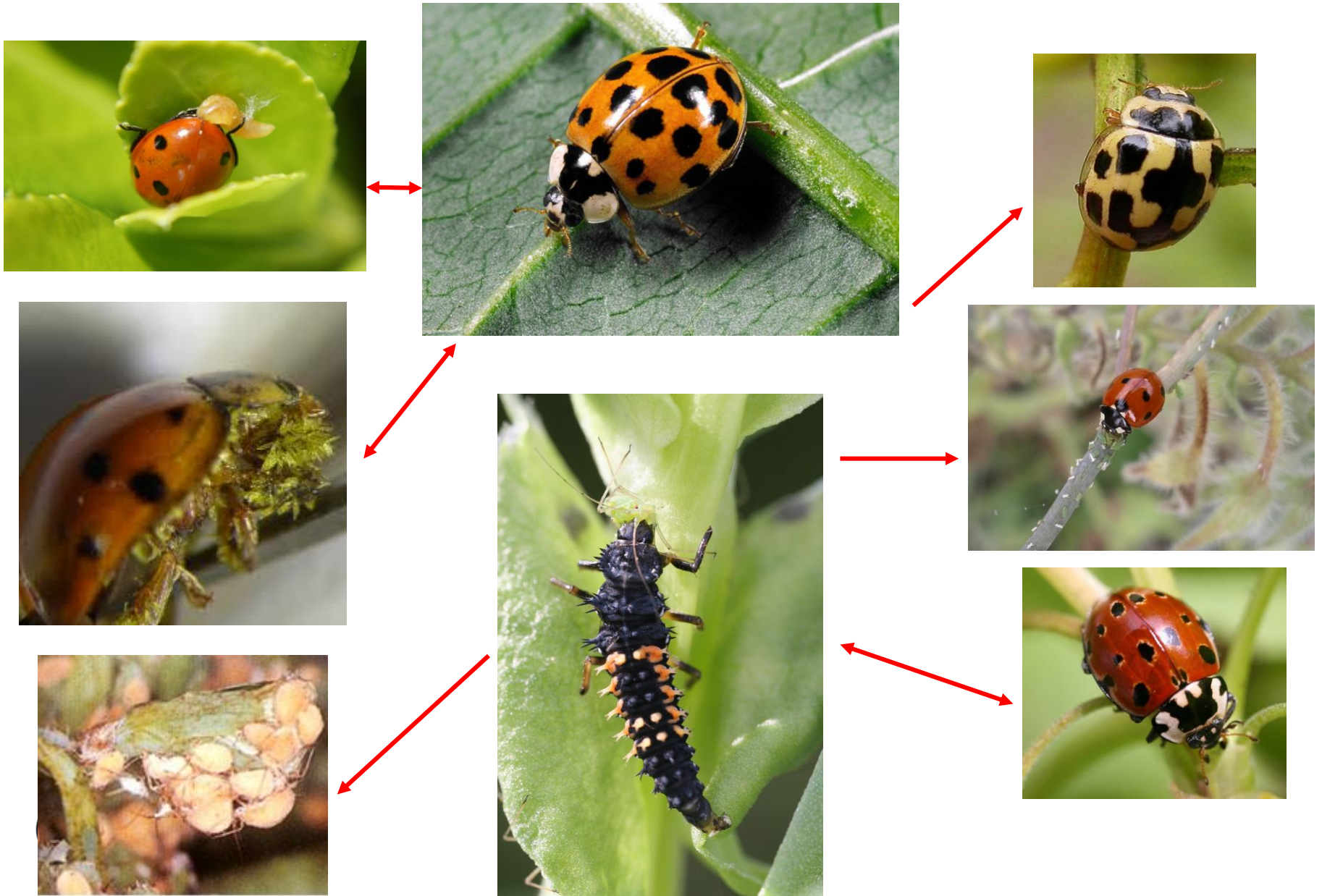


...inspiring recorders...





# ...unravelling ecology together...





- **Many opportunities**
  - Fun and collaborative way of engaging many people
  - Large-scale, long-term dataset (quality assured!)
  - Improving understanding of ladybirds but also invasion biology, citizen science...
- **Few challenges**
  - Never quite enough time for ladybirds...
  - Need to ensure rapid feedback and verification
  - Data flow always the greatest challenge



# Thank you



UK  
Ladybird Survey



Department  
for Environment  
Food & Rural Affairs



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