Challenges and opportunities for recording well-loved species

Helen Roy and Peter Brown (and nearly 19 000 others)
...a ladybird perspective
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/
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

We're being invaded - by ladybirds

31 October 2016

Science & Environment

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

Lewis Smith Environment Reporter

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

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 accomplish.

Since 2005 more than 20,000 sightings have been recorded of the ladybird, which threatens to take over from many of the 48 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.

“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 survival 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, its numbers became established and spread widely.

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

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.

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Mr Brown said: “Ladybirds are very popular but this one is a great concern in terms of its risk to biodiversity.”
Atlas, field guides and resources
201 972 = total number of ladybird records
(188 397 = verified)
Records over time

Number of records

- 0
- 10,000
- 20,000
- 30,000
- 40,000
- 50,000
- 60,000

- 1961-1965
- 1966-1970
- 1971-1975
- 1976-1980
- 1981-1985
- 1986-1990
- 1991-1995
- 1996-2000
- 2001-2005
- 2006-2010
- 2011-2015
Records over time

- BRC established
- Coccinellidae Recording Scheme
- Cambridge Ladybird Survey
- Harlequin ladybird arrives
- On-line recording
- iRecord Ladybirds app

Number of records over time:
- 1961-1965: 0
- 1966-1970: 10,000
- 1971-1975: 20,000
- 1976-1980: 30,000
- 1981-1985: 40,000
- 1986-1990: 50,000
- 1991-1995: 60,000
- 1996-2000
- 2001-2005
- 2006-2010
- 2011-2015

BRC: Biological Records Centre
Coccinellidae: Ladybirds
Cambridge Ladybird Survey
Harlequin ladybird
iRecord: Mobile app for recording
18 870 recorders
Many recorders submit only a few records
Many publications

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

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

Bethan V. Purse1*, Richard Comont1, Adam Butler2, Peter M. J. Brown3, Clare Kessel4 and Helen E. Roy1

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

Daniel L. Jeffries1, Jason Chapman2,3, Helen E. Roy4, Stuart Humphries1, Richard Harrington2, Peter M. J. Brown5, Lori-J. Lawson Handley1*

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

HELEN E. ROY1 and PETER M. J. BROWN2 1Centre for Ecology & Hydrology, Oxfordshire, U.K. and 2Animal 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.

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Evidence</th>
<th>References</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eurytopic nature of <em>H. axyridis</em> will contribute to rapid spread</td>
<td>The range of host plant associations and widespread distribution of <em>H. axyridis</em> in Britain reflect the eurytopic nature of this species, although coniferous woodlands may negatively affect the spread of <em>H. axyridis</em>.</td>
<td>Brown <em>et al.</em> (2008b, 2011a)</td>
<td>+</td>
</tr>
<tr>
<td>Climatic adaptability of <em>H. axyridis</em> will give it a competitive advantage over some of the more niche-specific native ladybirds</td>
<td>Habitats broad in southern Britain, but are speculated to have limited its abundance in northern England and in Scotland.</td>
<td>Comont <em>et al.</em> (2012) and Purse <em>et al.</em> (2014)</td>
<td>+/?</td>
</tr>
<tr>
<td>There are clear discrepancies between the observed and predicted (climate) distributions of <em>H. axyridis</em>, 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.</td>
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<tr>
<td>Continual breeding of this species is apparent and at least two generations of <em>H. axyridis</em> have been observed each year since invasion.</td>
<td></td>
<td>Brown <em>et al.</em> (2008b) and Roy <em>et al.</em> (2011a)</td>
<td>+</td>
</tr>
<tr>
<td>Multivoltinism contributes to the rapid rate of population growth of <em>H. axyridis</em> each year and, consequently, to spread.</td>
<td></td>
<td>Michie <em>et al.</em> (2010) and Purse <em>et al.</em> (2014)</td>
<td>?</td>
</tr>
<tr>
<td>Phenotypic plasticity displayed by <em>H. axyridis</em> enables local adaptation at temporal and spatial scales; increase in autumnal melanisation may have accelerated the spread of <em>H. axyridis</em>.</td>
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<tr>
<td>Further work is required to elucidate the importance of phenotypic plasticity in the invasion success of <em>H. axyridis</em>.</td>
<td></td>
<td>Brown <em>et al.</em> (2008b, 2011b) and Roy <em>et al.</em> (2011a)</td>
<td>+</td>
</tr>
<tr>
<td>The first record of <em>H. axyridis</em> in Scotland was in 2007. However, there are relatively few records in Scotland and its distribution and breeding there are limited.</td>
<td></td>
<td>Wells (2011)</td>
<td>?</td>
</tr>
<tr>
<td>High dispersal ability of this species has clearly been demonstrated in most of England and Wales.</td>
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<td></td>
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<td>Recent research highlights the importance of <em>H. axyridis</em> as an aphid predator in crop systems in the UK.</td>
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<tr>
<td>Further work is required to explore the ecosystem-level impact of <em>H. axyridis</em> on pest insects and particularly the ecosystem service provided by this alien predator.</td>
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<tr>
<td>There is considerable evidence of intra-guild predation from laboratory and field observations.</td>
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<tr>
<td>Observations from the UK Ladybird presence of <em>H. axyridis</em> and decline. Further work is required on competing mesocosms suggests that high aphid There is considerable evidence of effects on ecosystem function. A few studies indicate the importance interactions.</td>
<td></td>
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</tr>
<tr>
<td>The importance of chemical defense advantage of <em>H. axyridis</em> over naive There have been many reports of <em>H. axyridis</em> in dwellings, and in some cases pests There is some evidence of negative outcomes</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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

Ecological Entomology

INVITED REVIEW

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

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

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

Audrey A. Grez, Tania Zaviezov, Helen E. Roy, Peter M. J. Brown and Gustavo Bizama

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

Mary M. Gardiner, Louise L. Allee, Peter MJ Brown, John E. Losey, Helen E Roy, and Rebecca Rice Smyth

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-sciences programs to examine the costs and benefits of data collection from direct citizen-science data (data used without verification) and verified citizen-science observations. Data collected 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.

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

Alois Honek, Zdenka Martinkova, Anthony F.G. Dixon, Helen E. Roy and Stanislav Peinar

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

Helen E. Roy; Peter M. J. Brown; Tim Adriaensen; Nick Berkvens; Isabel Borges; Sesana Cossee-Trouillas; Richard F. Connott; Patrick De Clercq; Rene Escobel; Armand Estoup; Edward W. Evans; Benoît Faou; Mary M. Gardiner; Artur Gil; Audrey A. Grez; Thomas Guillemand; Damar Hadjiev; Annette Herz; Alois Honek; Andy C. Howe; Camp Hui; William D. Hutchinson; Mark Kaufman; Robert L. Koch; Jon Kofran; Lari Lawson Haldner; Eric Lomback; Anton Loosman; John Losey; Alexander G. Lukashuk; Dirk Maes; Alexandra Magro; Karlie M. Murray; Gilles San Martin; Zdenka Martinkova; Ingrid M. Minns; Oldřich Nevalov; Martin J. Orlova-Bienkowska; Nanaa Ouswa; Wolfgang Rabitsch; Hans Peter Raun; Gabriele Rondot; Stef L. Rork; Sergey K. Ryndichev; Min-Gyo Saethre; John J. Stogett; Antonio Ondrej Soares; Rizan Stahl; Matthew C. Titus; Axel Vanderven; Paul van Wielink; Sandra Vighelova; Peter Zach; Ilya A. Zakharov; Tania Zaviezov; Zhuhao Zhao

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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

Choosing and Using Citizen Science

Guide to Citizen Science

UK Environmental Observation Framework

Citizen Science & Environmental Monitoring: Evaluating Opportunities, Costs and Benefits

Centre for Ecology & Hydrology

Joint Nature Conservation Committee
13 565 = unverified ladybirds records

Emma Seward
48,726 (26%) = verified harlequin records
Many potentially under-recorded species
Improving data flow

One UK Ladybird Survey week:

31st 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

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)
- Creative Commons with Attribution (CC-BY)
- Creative Commons, with Attribution, Non-commercial (CC-BY-NC)

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