Evaluation report of 'Invertebrate Challenge' Project

HG-09-02206

16th September 2010 – 17th December 2014

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- 155 events carried out
- 40,000 biological records of difficult species submitted and an addition 30,000 records of other insect taxa.
- SEDN database – difficult invertebrate records per year submitted rise from 5300 records in 2010 (prior to IC) to 18,000 in 2013 (239% increase)
- SEDN database – difficult invertebrate records of new species per year – 98 in 2010 (prior to IC) to 194 in 2013 (104% increase)
- SEDN database – difficult invertebrate species recorded per year – 1207 in 2010 (prior to IC) to 1712 in 2013 (42% increase)
- Entomology reference collection established
- Entomology library established
- 9x editions of Shropshire Entomology published
- 4x Shropshire distribution atlases published

Compiled by - Pete Boardman – Invertebrate Challenge Project Officer

Introduction

The Invertebrate Challenge (IC) (HG-09-02206) was originally a 3-year project funded by HLF (£220,800.00), the Field Studies Council (FSC) (£15,000), Jean Jackson Charitable Trust (£10,000), Esmée Fairbairn Foundation (£4,008), Shropshire Ecological Data Network (Shropshire's virtual local records centre) (£3,840), and the Clive Tate Charitable Trust (£500). The Project Manager, Pete Boardman, began work on the project on the 17th January 2011.

During 2012 FSC were recipients of a grant from DEFRA to run a project named Biodiversity Fellows (bio.fells) which the IC project manager ran through 2013 with the permission of HLF. During this time IC was kept ticking over with fewer events than in other years but this enabled IC to run longer than originally scheduled to do so. Therefore IC was extended by a year with extra support from FSC and ran through until December 14th 2014, a year longer than planned. This enabled IC volunteers to take advantage of extra training offered by bio.fells and receive extra training during 2014.

Approved Purposes

The approved purposes of the project as laid out in the acceptance letter (dated 16th September 2010) were;

1. Develop volunteer invertebrate recorders who are knowledgeable and confident to accurately record invertebrates i.e. aculeate hymenoptera, hoverflies, craneflies, beetles, and spiders.
2. Increase the number of invertebrate recorders in Shropshire and the surrounding area
3. Increase the number of accurate and reliable invertebrate records in Shropshire and the surrounding area.
4. Raise the profile of the role of invertebrates as indicators of healthy bio-diverse habitats.
5. Trial the use of new technology (i-phones) which can hold electronic field identification and recording software (i-phone apps)
6. Build on the national example of good practice which was established by the Biodiversity Training Project, showing best practice in training for volunteers and support for biological recording with difficult species groups.

Notes on approved purposes

An extra species group was added to the list in approved purpose 1; Hemiptera, which in turn led to the Shropshire shieldbug atlas and some resources being deployed to support a new County Recorder for Hemiptera.

The original scope of the project was for people in "Shropshire and the surrounding area", however it soon became apparent that people outside of this geographical area were keen to take part in IC and commit to the level of study involved. This was due to the paucity of such free and intensive training being available elsewhere.

Tutors

The following tutors were employed by IC to deliver the bulk of the training of approved purposes;

- Ian Cheeseborough – aculeate hymenoptera
- Nigel Jones – hoverflies
- Pete Boardman – craneflies
- Don Stenhouse – beetles
- Paul Lee – spiders and harvestman

Other tutors employed by IC during the project were;

- Martin Godfrey – microscopy techniques
- Frances Riding – aquatic hemiptera
- Chris Du Feu – slugs
- Richard Comont – inconspicuous ladybirds
- Richard Burkmar – spiders
- Nigel Cane-Honeysett – spiders

Volunteers, participant data, and other project metrics of approved purposes

Volunteers and participant data

A total of 45 volunteers attended core training courses over the 4 years of Invertebrate Challenge. These volunteers (referred to as 'core volunteers') were people who were keen to sign up to the long term study of one or more groups of difficult core taxa during the tenure of the project.

To give the most amount of learning time to each attendee we had originally suggested that a maximum attendance of 6 per course would be an optimal level for tutors to cope with but interest was initially slightly higher than expected and so in cooperation with our tutors we upped our limit to a maximum of 10 people per course.

Table 1 illustrated the average number of participants across the core taxa over the period of the project. There was some drop off due to people moving away from area or other personal changes in circumstances, but the 2014 figures largely hold up to the level of interest predicted at the start of the project. The largest drop off of volunteers (see Table 1) was from the spider course which is perceived to be caused by the difficulty level of the subject. That said, the key outcome from the spider course has been a dynamic County Recorder who has completely transformed the spider database and is very active in the county and elsewhere.

	2011	2012	2013	2014
Aculeate Hymenoptera	8	7	7	6
Diptera: Syrphidae etc	9	7	7	7
Diptera: Tipulidae	7	7	6	5
Coleoptera	7	6	6	4
Araneae	9	7	4	3

Table 1 – average core taxa volunteer numbers during Invertebrate Challenge

In addition to the core taxa courses several other courses were held including;

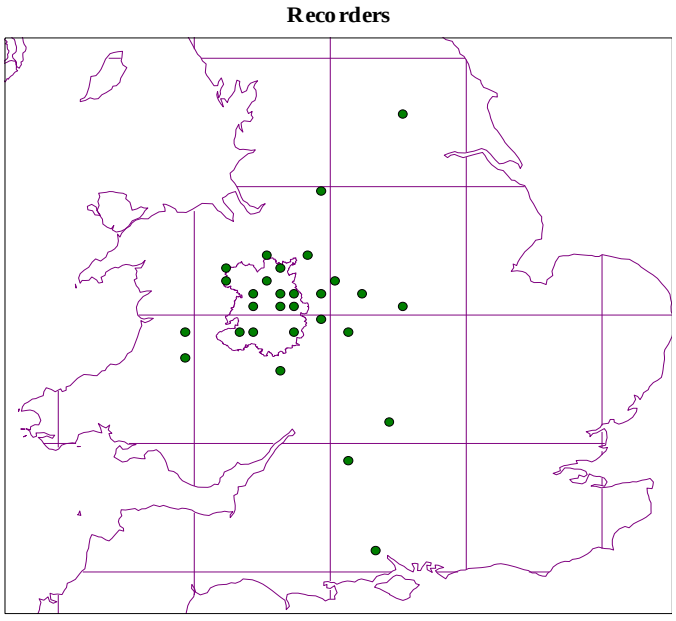
- 2 x beginners entomology course (20 attendees)
- 1 x microscopy course (11 attendees)
- 2 x shieldbug identification courses (30 attendees)
- 10 x atlas recording events (average 7 per event)
- 4 x Shropshire Entomology Day (average 60 per event)

In total 138 core events were held with a further 17 extra events / field days making 155 in total.

By the finish of the project there were approximately 23 core recorders who had seen the project through and who have been submitting high quality records of difficult invertebrates to their relevant recording schemes. Of these approximately 17 people can be considered to be making a substantial difference to the biological recording of difficult invertebrate taxa and could be described either as a County Recorder in their respective Vice County, or a key regional recorder for a national recording scheme or society. The importance of this cannot be overstated for difficult groups of invertebrates!

A further 40-100 volunteers were involved in the atlas projects (see Addition Outcomes for more information).

Volunteers were originally expected to originate from Shropshire or the immediate region however due to the paucity of similar training nationally people were keen to join IC from further afield. Map 1 shows the home locations of core volunteers throughout the project.



Map 1 – Home locations of core IC volunteers

Biological Records

It is estimated that approximately 40,000 validated and verified records of difficult invertebrate taxa have been made by project volunteers directly as a result of the Invertebrate Challenge training, and a further 30,000 records of less difficult taxa have been made by the project's involvement in the SEDN and supporting other biological recorders.

By the end of 2013, SEDN data shows that 42% more species were recorded than before the IC project started, 104% increase in new species, and a 239% increase in the number of records than before the IC project started.

Table 2 illustrates the steady rise in the number of new records during the Invertebrate Challenge (2011 onwards) and compares it to pre-Invertebrate Challenge showing a steep increase from 2011.

Year	No. of new records	% increase on previous year	% increase compared to pre-IC
2010	5304	-	-
2011	5748	8%	8%
2012	10785	88%	103%
2013	est. 18000	67%	239%
2014	*see note (p7)	-	-

Table 2 – Number of new records per year of difficult taxa encompassing the period of Invertebrate Challenge

Table 3 illustrates the number of new species of difficult invertebrate recorded during the Invertebrate Challenge era and illustrated a steep rise in these.

Year	New species	% increase on previous year	% increase compared to pre-IC
2010	98	-	-
2011	163	66%	66%
2012	184	13%	88%
2013	est. 200	9%	104%
2014	*see note (p7)	-	-

Table 3 – Number of new species per year recorded of difficult taxa encompassing the period of Invertebrate Challenge.

Table 4 illustrates a gradual increase year on year of species of difficult taxa recorded when compared to pre-Invertebrate Challenge figures.

Year	Species per year recorded	% increase on previous year	% increase compared to pre-IC
2010	1207	-	-
2011	1398	16%	16%
2012	1474	4%	19%
2013	1712	16%	42%
2014	*see note (p7)	-	-

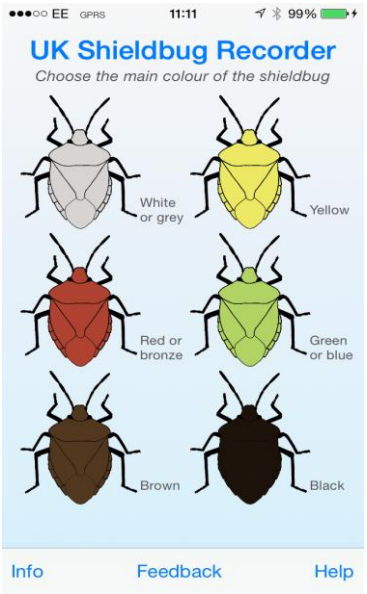
Table 4 – Number of species per year recorded of difficult taxa encompassing the period of Invertebrate Challenge.

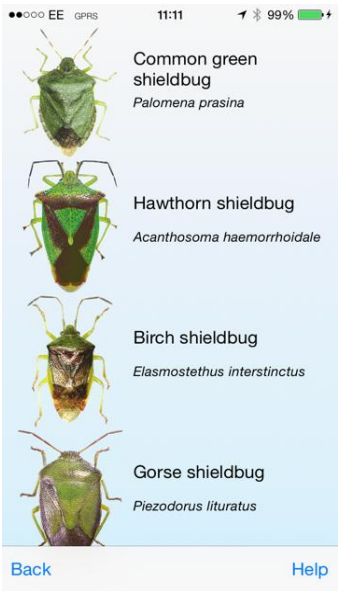
* Note – Figures for 2014 can only be compiled early in 2015 once all data has been received from recorders. Therefore these figures will not be available until the end of February 2015.

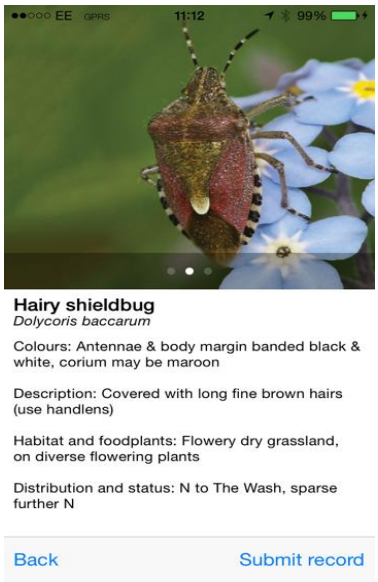
Other outcomes of approved purposes

UK Shieldbug Recorder app

One of the approved purposes of IC was to trial new technology in the form of apps and software. This was undertaken by the production of an app (UK Shieldbug Recorder) to enable to identification and online recording of shieldbugs. IC worked with the national shieldbug recorder (Tristan Bantock) and FSC Publications (as contractor) to develop a shieldbug app based upon the FSC fold-out-chart on shieldbugs that was original produced in 2004. During the development of this app new technologies in the sphere of online recording (notably the development of iRecord (http://www.brc.ac.uk/irecord), a recording website that connects with the NBN Gateway) delayed our progress, as the opportunity to link in with this site was deemed essential. The development of bespoke software and code to enable that to happen is still ongoing in partnership with the Biological Records Centre (BRC), but will be concluded by the spring of 2015. The images below show the various screens as seen on an i-phone.







Figs 1-3; Screen grabs of UK Shieldbug Recorder

Shropshire Entomological Newsletter

An entomological newsletter was seen as an excellent way to highlight the progress of IC locally, regionally and nationally. This was edited by the Project Officer and appeared twice a year during the tenure of IC.

One of the great successes of the newsletter was that it was a place that enabled volunteers who had not published any articles / field notes before to gain the confidence to do so, and some went on to publish widely in the newsletter and elsewhere. It also enabled others outside of our geographical region to see the progress of entomology in Shropshire due to IC, and so acted as a publicity vehicle. Due to project officer connections with the Invert Link group the newsletter was routinely circulated nationally to an audience of invertebrate specialists.

All newsletters are held on the Invertebrate Challenge website (www.invertebrate-challenge.org.uk) and can be downloaded as PDFs.

Entomology Collection

An entomological collection of voucher specimens was assembled during the tenure of IC by the project officer and volunteers. Voucher specimens are vital to the identification of difficult taxa and can be accessed at a number of museums nationally, however the nearest geographically to the IC project was over 70 miles therefore it was felt that a small synoptic collection at Preston Montford would be useful.

At the end of 2014 the collection comprised of approximately 3000-5000 specimens and covered the Diptera (flies), Terrestrial Hemiptera (true bugs), Aculeate Hymenoptera (bees, wasps, and ants), Coleoptera (beetles). A small collection of teaching specimens of Araneae (spiders) is held in alcohol.

Entomology Library

A library of entomological books was assembled including those bought through IC, other previous HLF-funded projects, donations, and stock from the Preston Montford library. These were used by volunteers on training events, or for their own research / interest. A list of the available titles (approximately 750 books) is available from the Invertebrate Challenge website.

Preston Montford Bee Hotel

During 2012 the suggestion was made by our Aculeate Hymenoptera volunteers to build a large bee hotel to accommodate species of aculeates to enable further study at close quarters, and so a small project to take this suggestion forward emerged. An external volunteer helped to coordinate the design and manufacturing of the bee hotel with a local contractor and IC and other volunteers / staff helped to populate it with suitable nesting material. Since then those interested in aculeates have regularly visited the bee hotel and recorded the many species using it.

Additional Outcomes

Distribution Atlases

As has long been recognised, the production of distribution atlases as a means of engagement for volunteer participation is a successful model and the opportunity arose to work on a number of these through Invertebrate Challenge. After canvassing core volunteers, tutors, and other entomological experts in the county it was decided to work on five distinct distribution atlases, some linked directly to training, and others taking advantage of willing recorders / compilers. Of the five atlases, three had been published at the time of the finish of Invertebrate Challenge, one was in

draft stage with an estimated completion date of spring 2015, whilst the one remaining (long-horned beetles) was dropped due to time constraints.

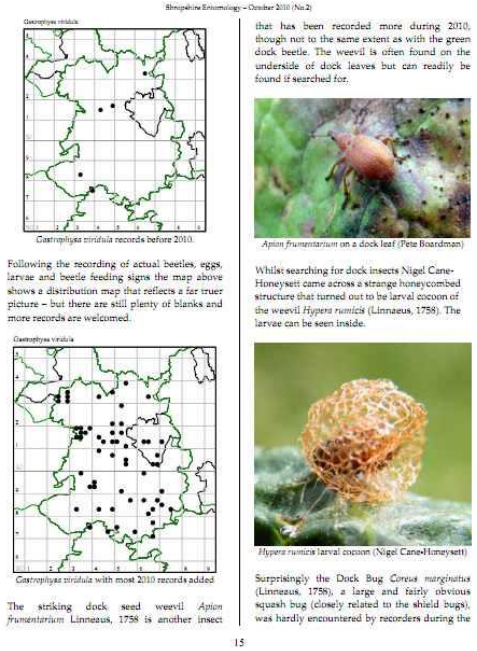
The published atlases were; A provisional atlas of the shieldbugs and allies of Shropshire (Pete Boardman); A provisional atlas of the bees, wasps, and ants of Shropshire (Ian Cheeseborough and Nigel Jones), and the smaller moths of Shropshire (Godfrey Blunt). These were published by Field Studies Council. The fourth atlas, Shropshire craneflies (Pete Boardman) is due in 2015. Funding for these was a mixture of savings made of project funds and external funding from the SEDN.

Rea Brook Valley LNR Survey

During the final year of IC the project officer suggested carrying a volunteer survey at a local wildlife site to show the progress made over the tenure of IC. The Rea Brook Valley LNR, an area of green space alongside the brook itself was chosen as it had not been directly surveyed before and access to the site was very easy.

A total of 3000 records were made by 34 IC volunteers during the extent of the survey (April-September 2014). 818 species of 21 orders of invertebrates were recorded with several Nationally Scarce, axiozoan, new to Shropshire, or locally important species noted. The most recorded group were the Diptera with 279 species recorded. Then came Coleoptera (148), Hemiptera (146) and Hymenoptera (83).

Species data was fed into ISIS software which gave details of the important habitats at the site. This in turn was fed back to the site managers, Shropshire Town Council.



Gastrophysa viridula records before 2010.

Following the recording of actual beetles, eggs, larvae and beetle feeding signs the map above shows a distribution map that reflects a far truer picture – but there are still plenty of blanks and more records are welcomed.

Gastrophysa viridula with most 2010 records added

The striking dock seed weevil *Apion frumentarium* Linneaus, 1758 is another insect that has been recorded more during 2010, though not to the same extent as with the green dock beetle. The weevil is often found on the underside of dock leaves but can readily be found if searched for.

Apion frumentarium on a dock leaf (Pete Boardman)

Whilst searching for dock insects Nigel Cane-Honeysett came across a strange honeycombed structure that turned out to be larval cocoon of the weevil *Hypera rumicis* (Linnaeus, 1758). The larvae can be seen inside.

Hypera rumicis larval cocoon (Nigel Cane-Honeysett)

Surprisingly the Dock Bug *Coreus marginatus* (Linnaeus, 1758), a large and fairly obvious squash bug (closely related to the shield bugs), was hardly encountered by recorders during the

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Fig 4 – Shropshire Entomology Newsletter

Fig 5 – Volunteers curating entomology collection

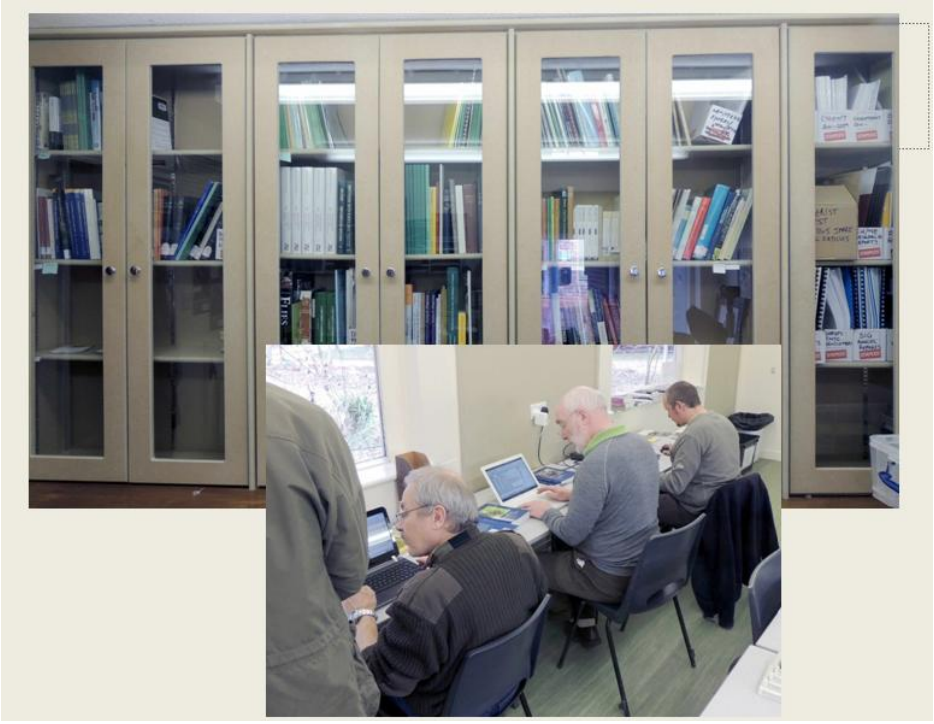

Fig 6 – Volunteers compiling the book list for the entomology library and the library cabinets

Volunteer Evaluation

A ten question evaluation survey was circulated to 40 project volunteers during the final week of November once all the training had been completed. A total of 31 people responded (78%) and a summary of points raised are detailed below. The full dataset of answers (without editing and alteration) are listed in the Appendix of this report.

Question 1 - With IC coming to an end what are your fears going forward? What impact will this have on you as a volunteer? The vast majority of answers highlight the fear that volunteers will gradually dissipate due to the lack of focus going forward. There will be no coordination of effort and the relationship with mentors will be lost terminally. A couple of people pointed out that the length of the project in itself was not sufficient to produce experts in all subject areas but people who know a bit more of than the basics, so that further progress will be frustratingly stifled without further support.

Question 2 - How do you think the lack of a coordinator (Project Officer) will impact on you and your role as a volunteer? Virtually all answers expand the view from Q1 that without coordination things will drift and die. A couple of people use the phrase "the project officer is the glue".... that binds the project together. Several people fear a lack of focus and coordination will de-motivate them and their volunteer experience will be severely affected. Several people commented on the effect it will have on their biological recording output.

Question 3 - Was having a mentor important to you? What impact did this have on your biological recording? Again virtually all answers extolled the mentoring system employed by IC as essential in peoples development and that a lack of mentorship would prevent them from increasing their skills, or taking on other groups of invertebrates. Once more the term 'focus' is used by several people to sum up how mentors have helped them develop. Others mention how access to mentoring gave them the confidence to submit records that they previously wouldn't have been able to do.

Question 4 - Have you in turn been able to mentor other people through your participation with IC? The majority of people answered affirmatively to this question and this ranged from helping their own family members to the more expert level of mentoring in a couple of cases. Most respondents claim a minor role in mentoring but it is very encouraging to see this.

Question 5 - What value do you place on access to reference collections for species identification? "Essential, important, vital, priceless" are some of the terms used by respondents to this question. Many beginners to the subject are known not to appreciate the need for access to voucher specimens within a reference collection so these comments reflect a maturity amongst the IC volunteers.

Question 6 – Is there any technology you use as part of your biological recording activity? If so what? Is there technology which you would like to use but access to is limited by price, availability, or lack of training? Several respondents highlighted their current use of digital photography and how important that is in their identification process of some species (i.e. those that can be identified from photographs). The majority of people use microscopes (either their own or Invertebrate Challenge ones) to identify specimens. A couple of people say that their own kit is less good than IC kit and therefore a potential loss of access may affect them. A couple of people note the use of (or potential use of) biological recording software and would like to be training in GIS usage. I think these answers are fairly typical of biological recorders in general and show a range of answers that are reflective of the technological competencies of the particular respondent involved.

Question 7 – Do you think biological recording is too confined to a certain sector of society? How might FSC increase the age range or diversity of people involved? Is this important to you? Most respondents thought that this was important and that biological recording is too confined within certain sectors of society. Interestingly a lot of people picked age as a factor rather than socio-economic reasons or demographics. Most people who thought this was important suggested that more young people should be exposed to biological recording at a young age and that financial issues such as cost of equipment and courses are potentially a barrier. A few people suggested that geography is an issue and FSC needs to go to where people are situated with outreach activities. One person nicely summed this up by saying that a similar survey to the Rea Brook one held in an inner city green space may be a good way of attracting a different set of people. However another person made the valid point that we need to be sure exactly what we are after; do we want more people making biological records of easier taxa, or a supply of a smaller set of people tackling difficult taxa as IC has done.

Question 8 – Is there anything you would have liked to have done as part of IC that you were not able to do? (Groups of taxa etc) Most people seemed satisfied that the groups of taxa, events etc were those that they wanted to do, however one respondent complained that too many of the courses were held during the week and not enough at weekends. A couple of respondents listed groups of taxa that they would have liked to have done but the overall impression was that the available list was enough to be going on with!

Question 9 – Please estimate the number of biological records you have made AS A RESULT OF the training you've had (to the nearest 500 please)? Approximately 35,000 records in total have been made by volunteers as a direct result of the training received.

Question 10 – In a "throw those curtains wide, one day like this a year would see me right" (Perfect Day by Elbow) kind of way - was there a moment during in IC when you thought "wow" - please describe it? There is little point summarizing this question as each answer is individual to the respondent but nevertheless it is well worth reading through the individual points made within the Appendix of this report.

Fig 7 – Compilation photo of some of the Invertebrate Challenge volunteers out and about biological recording.

Appendix I – Invertebrate Challenge evaluation responses*

*All responses were entered anonymously using Survey Monkey and they have been reproduced exactly as submitted with no editing or alteration.

1) With IC coming to an end what are your fears going forward? What impact will this have on you as a volunteer?

- The end of the Invertebrate Challenge leaves me searching for where I may receive such informed training, support and learning opportunities. My efforts so far have met with no comparison, either what is offered is piecemeal, very restricted in its scope and at prohibitive cost. My concern therefore is how I build upon that which the Invertebrate Challenge gave me.

- With the imminent cessation of the IC project, my fear is that the number of records will decrease and invariably fizzle out over time. As someone, who is in full time employment and, who tries to juggle life's other demands, it is all too easy for these to dominate and not allow time for something as important as biological recording. Having a project like IC gives structure to the annual recording calendar, as well as providing courses that renews enthusiasm. The courses make you eager to get out into the field and apply the theoretical knowledge learnt from the classroom sessions that IC provides.

- Unlikely to tackle difficult species groups without assistance when required.

- I do fear a reduction in the overall effort that will be put into recording. Working intensively on atlases can leave one a little deflated when it is all over. Not everyone is so committed to recording and the learning process that goes with it when there is no clear object in sight. For myself I don't expect a great impact as I have been a committed recorder of biological groups for many years.

- Will need to ensure regular meet ups with the group to maintain momentum. Don't want it to just drift after such a good start.

- Where to go and what to do? I can carry on pottering around as before, but does it have a purpose?

- Lack of a focal point for activities - without some coordination I'm afraid the good efforts will be lost; the foundations won't be built on. I fear there will be a loss of momentum and those who are developing skills won't be able to reach their potential.

- Less opportunity to survey in Shropshire.

- That my rate of improvement of my id skills will not continue as they have over the period of IC.

- Lack of contact with others. No further projects such as Atlases.

- The momentum built up over the past years could be lost. A lot has been achieved. Without IC there could possibly be no aims and challenges to work towards.

- The interest generated by the excellent work of the IC project may dwindle. Although there is a hard core of committed recorders, the momentum will be lost.

- I fear that the clear direction, focus and motivation will dissipate and all the superb encouragement and team building will have been for nought. I have been recording in Shropshire for over 40 years, mostly as a lone worker. The progress in recording and knowledge building with IC has been outstanding and transformed the approach in Shropshire. Are we to return to the uncoordinated approach with sets of data lost?

- My fears would be that courses would be limited to those that prove popular enough to fill with paying customers missing out on important under-recorded taxa.

- The Central Coordinator has provided the drive to "make things happen ". Without this role there may not be the continuous driving force to maintain people's involvement over time . Goals/targets/ and date setting/deadlines prevent drifting. IC has provided a critical Link Up across the Biodiversity spectrum which is lacking within the isolated approach of many of today's Natural History organisations. It has provided the means for laypeople to become involved in detailed training/ studies not offered by NH & Academic organisations.

- IC has been a magnet for local and not so local invertebrate enthusiasts to meet and impart knowledge both formally and informally. This focus will be difficult to achieve once IC is finished.

- No fears. No impact. We will continue to make biological records through the Wrekin Forest Volunteers summer surveys and our own personal moth trapping.

- My fear is that the recording of invertebrates will diminish if it is not championed through a project. My belief is that invertebrates do not pull in the numbers like other groups thus they are seen as a lesser priority. However, if you look at how many species are reliant on invertebrates, they are a keystone group to follow. We have only scratched the surface in our learning and I am worried that it will end with the project due to the lack of support. As a volunteer, who works full time, I believe that this will have an impact on my recording in the future. Rightly or wrongly, the majority of records that are submitted are thanks to projects such as the Invertebrate Challenge project. The field days are crucial as well as the workshops. It enables volunteers to share information and to learn from one another so records are submitted promptly.

- I hope it will have as little impact on me as possible, but I worry about the potential reduction in contact with others & sharing of skills that this brings.

- I worry that important identification skills will not be passed on to others. The training has been very valuable and is an opportunity for knowledge to be shared.

- Invertebrate Challenge should have left us sufficiently well versed in our chosen taxa to be able to stand on our own two feet. However, there will no longer be a safety net available centrally should we have general queries on how to proceed, get information, suggest solutions and generally assist in any situation that we have not come across before. This may

make my activities more difficult and time-consuming or, in an extreme case encourage me not to bother. As a volunteer I appreciated the insurance cover we had for our activities. This is something I will miss and is already causing concern. Lack of insurance will restrict where we can survey especially on private land where the owner or manager insists on suitable insurance before permitting access. At this stage I do not anticipate the end of the Project to signal any change in my intentions to carry on to the best of my ability.

- That there will be coordinated activities that draw the volunteer community together to continue the work.
- It will cut down my opportunities to get out and about with fellow recorders. I enjoyed recording for the shieldbug atlas particularly.

- Loss of coordination of and motivation for insect recording. Not having a reason to spend time and share knowledge with like minded people. Loss of access to sites I wouldn't normally visit.

- I fear that the community feel and wider support of other IC participants and mentors will be lost. I also worry that the momentum of learning will slip without periodic workshops and field days to prepare for and learn from.

- I fear there will be a lack of coordination and structure and this will result in interested people not getting involved as they do not know where to start. It will also lead to an increasingly disparate group of invertebrate recorders as there will be no news letters or events to bring people and interests together.

- Lack of support and organisation.

- The structure will not be there any longer without a central point of information, knowledge, guidance etc.

- Difficulties in getting taxa I am not familiar with verified by an expert.

- My fears are two-fold: 1. Because we have been studying difficult groups of invertebrates, one doesn't achieve a high level of competence in their identification in 3 to 4 years, in spite of the excellent training provided during the IC project. So, just as participants are beginning to 'get to grips' with their chosen group/s, the project is coming to an end. 2. Many recorders work in isolation. Without ID co-ordination and direction from a project officer/mentor, they can become de-motivated and may not continue with recording, thereby wasting the training they have received. Personally, I will continue to take records of the groups I have studied but I feel that I still have much to learn and would have benefited from an extension of the IC project.

- That the support and current network of people will dwindle and eventually disappear. Whilst I'm keen to continue learning, and recording the species I see, it will feel less essential without the background assistance and support and motivation will deteriorate.

2) How do you think the lack of a coordinator (Project Officer) will impact on you and your role as a volunteer?

- The Coordinator's role was best described being a focussing entity, whilst we addressed what we did in terms of commitment and effort, without that being more proactively led in the early days and then latterly responding to observed learning and attendee needs we would not have progressed as far as we did. So the converse, without one, the potential to not achieve focus and direction, often staying within ones comfort zone and thereby not accruing the wealth of additional learning beyond ones pet taxa.

- Having a Project Officer is of the utmost importance to our role as volunteers. The Project Officer is the "glue" that holds the entire recording effort together. Invertebrate recording is divided into a number of separate orders i.e. Coleoptera and Diptera, which in turn are separated into families such as the Carabidae. The study of such order / families can be restricted to the experts and, without a project like IC, it can be difficult to gain access to such groups; the groups can easily become clique groups, as is human nature. The Project Officer is the person who blends all of these groups together to make biological recording a unified campaign, thus benefiting the entire project at a volunteer, group and recording level. I feel that not having a project officer is akin to having an orchestra without a conductor.

- A project organiser helps to provide the assistance mentioned in 1

- Not greatly on me for the reasons given in the latter part of the answer in Q1 above.

- Project Officer has been a focal point apart from providing resources. Will need to find a similar focus beyond IC

- I think the lack of a coordinator will achieve exactly that - a lack of coordination. How to know what others are doing, or what needs doing.

- As a volunteer I value knowing that what I'm doing is a co-ordinated part of something bigger and I'm concerned that without support folk that are interested in these overlooked species groups will struggle to remain linked in to that bigger picture. I don't have sufficient time to volunteer to take on such coordinating activities. I may well be less motivated when I don't see recognition for this kind of work.

- Much less opportunity to record and have collated records validated.

- I will not get information of new sites or of survey opportunities (eg Rea Brook Valley), or things to look out for (early season longhorn beetles). The Project Officer is also the glue which helps us all improve.

- No longer a focus, someone to suggest ideas to, no one to circulate information. Newsletters etc. Organise events and training limited.

- The coordinator is the central figure and without one there would be no one to encourage, inspire and organise.

- The opportunities for me to engage with fellow entomologists will be limited.

- Much of what I've said in answer to question 1 applies. It's too easy to underestimate the transformation of individuals by a good coordinator. Where do I go for guidance, expert

knowledge, interface with others in the team. Will a team still exist? My recording efforts have been given an enormous boost by IC.

- It was good having a point of contact for the project and also gave me access to more material after courses.

- Although committed to the process, without clear direction/dates/goals I believe time pressures from today's lifestyle can easily overtake commitment to any scheme .

- The Coordinator has been instrumental in meeting organisation, course provision and liaison between interested parties. Once this vital position is lost the cohesion we have depended on will be lost and the membership will disperse.

- No impact. See Q1 answer.

- As a volunteer, a Project Officer is key to the success of biological recording. When days are properly coordinated, people make time to attend and to record. When people are on their own, it is difficult to know where to focus. For example, if I wanted to know where there was a particularly under-recorded area in Shropshire, I would contact the Project Officer. Without this facility, I do not believe that the information would be so readily available. Having that key contact is crucial as a volunteer.

- Same as above. Having a focal point to whom to address questions has been a key element of the last three years for me.

- Having a project officer has been excellent in keeping volunteers informed about training days and workshops. It has also helped to inspire people about recording and has highlighted the importance of making records.

- He has provided and continues to provide the inspiration to attempt things that I would not normally do!! If he is not in post then that inspiration is missing. In addition he has been the provider of the safety-net for our activities.

- It will mean that there is no coordinated activity and risks losing the volunteers who came onboard as a direct result of the IC.

- I think they'll be a drift off of people once the co-ordination and focus ends

- Reduction in records. Loss of data sharing and networking. Loss of access to varied sites.

- I am not sure. I hope that enough IC volunteers across the taxonomic interest groups are motivated enough to continue to organise periodic field days and meetings with their group. I have already discussed this with the aculeate group and hope to arrange at least annual 'Bee's Knees-up' field-days and/or workshops.

- Hugely- the nature of so many varied niche interests means typically there's next to no structure or communication. IC has provided both of these things and a real focus point and most importantly contact and coordination point for invertebrate interest and activities.

- Focus will move off IC to other areas.

- Pete not only shared knowledge with volunteers and taught us about invertebrates. He also motivates us through his enthusiasm.

- Not sure how continuing contact with IC's community of volunteers will be maintained. I am most concerned about a lack of co-ordination post IC project

- It will slow my progress and thus they effectiveness of my role as a volunteer recorder of the groups studied.

- Quite honestly, I can't imagine it! The enthusiasm, guidance and help, not to mention patience, that the current Project Officer has given me has boosted my confidence, helped me learn so very much more and given me a sense of importance to being a volunteer and recording all my sightings. Without this, I'd simply probably still be a casual observer taking photos, as I used to be.

3) Was having a mentor important to you? What impact did this have on your biological recording?

- Having a mentor made the whole thing work for me, I provided my own observations and there was a range of excellent resources on hand, BUT without the mentors time served experience to add context and answer questions - "when does yellowish brown differ from brownish orange" or "the character is usually seen, ?" would never have been addressed to conclusion. A project such as this one needed layered staffing such as this had, without it would have often ended up looking like Foggy, Compo and Clegg from Last of the Summer Wine!

- There is no substitute for having a mentor, who is a specialist in their field. To be able to tap into the wealth of knowledge that the mentors have is indispensable. The amount of knowledge gained in a single days tutoring, from a mentor, is equal to many months of aimless solo study and field work. Going solo would rely greatly on a trial and error based approach whereas when you have a mentor, this can be bypassed. They have already gone through this stage at the start of their learning curve thus are able to disseminate this information to volunteers.

- Adds validity to records and provides a motivation when struggling

- Very important. Unless one is an established expert it is a big confidence boost to have someone to discuss uncertainties with.

- Yes. I am still not confident about identifying species, particularly crane flies.

- Vital - years of struggling in the dark with even basic ID of aculeates, then suddenly light! Sort of.

- Having a mentor makes a huge difference when tackling tricky identification. Helps keep you motivated, keeps your learning moving forward, builds confidence. Most people would give up without support.

- It has been vital having access to the mentor. I have been able to use his skills to assist me to identify the species in a very large invertebrate group. Also assisted me for my MSc.

- Yes, someone to help me with id, creating a record. More importantly focussing me to submit records I make on my own.

- Not so much, but having contact with experts to help with more difficult id issues was very helpful. May mean some species are not named without expert help.

- Yes. I possibly would have not done any recording without a mentor who encouraged me.

- Yes, it was. It prompted me to record in areas I would not have considered and enabled me to record many new Shropshire species.

- Yes it was vital and moved recording from individual to team focussed. Ideas for new development and projects as well as deepening certain lines of study was a real bonus.

- Yes as it gave me the confidence to try recording groups I would not have tried by myself.

- Starting from scratch through BAP and IC processes we realised how much there is to learn. We would not have been able to become so actively involved and progress as rapidly without the mentoring- it was essential to provide the detailed knowledge to start within the process . For instance during the 7 years (4 BAP 3 IC) we have submitted over 21000 records on County moths and are still learning from the Mentors.

- N/A

- Didn't really have a mentor other than the collective knowledge of all taking part. No impact on our biological recording, we simply recorded all we could find and identify.

- It would have been very difficult without having a mentor and I would have probably not continued if I was attempting to identify species solely. It is extremely difficult and identification errors can be made without a mentor. Therefore, it was extremely important to have someone with the skills and knowledge to learn from. I was able to do my MSc dissertation on beetles thanks to this project.

- So far as aculeates are concerned it made all the difference in the world. Most of the fieldcraft just doesn't exist in the literature.

- Both Pete and Ian have been fabulous. They have been great at teaching some very complex subjects and I have remembered lots of the little tips that they have taught me on how to correctly identify species. This has in turn made me more confident to submit records.

- You only realise how important something is when it is no longer there. Certainly having mentors for craneflies and hoverflies encouraged me to tackle the more difficult species which may have been overlooked otherwise.

- It has been very important. It was IC and the enthusiasm, knowledge and influence of the project officer that encouraged me to become involved in this area.

- It's that human touch and always having someone to ask. I'm sure I'd probably have given up without the encouragement of Pete and other mentors.

- Yes. Gave me confidence.

- YES absolutely. I am hugely indebted to my mentor, I would have progressed far more slowly without their support, guidance and patience. Having a mentor has enabled me to progress to the point where I feel confident enough to submit my records. Having someone to verify your correct identifications and also to explain where you are going wrong is invaluable.

- Didn't really apply as I tutored a one off course, however Pete has often been like a mentor providing a useful sounding board for queries related to my roles in invertebrate biological recording

- Very

- It was very important. Pete highlighted the important reasons for biological recording and was able to offer guidance as and when required.

- It was extremely useful to have access to mentors for Coleoptera and Craneflies

- It was extremely important. Having ready access to a mentor not only gave me confidence in the veracity of the biological records that I have been submitting but also increased the rate at which I learnt to successfully identify species.

- Most definitely! To begin with, it was good to have someone there to help identify specimens and show how to find them in the first place. Then it was invaluable to have the continued support in having someone to confirm one's own identifications. Again, this boosts confidence and helps to guide us in finding more challenging or rarer species.

4) Have you in turn been able to mentor other people through your participation with IC?

- Amazingly yes! I have helped at three or four bioblitzes and explained what I am doing and how to get started doing it to people who ask when I am out in a group or on my own.

- Yes, local groups in Worcestershire.

- Yes. I have had the confidence in Field Societies to point out and identify various invertebrates encountered.

- Yes very much so. It has been gratifying to see relative beginners gain confidence and skills in taxonomy, and feel that I have assisted in that.

- Yes, it's a synergistic outcome from working together with the ability to challenge views, results etc.

- In my day job I am a support worker for young adults with learning difficulties. I have been able to use what I have learned to teach them ID skills for slugs, leaf mines and spiders and get them enthused with theses under-appreciated invertebrates.

- Yes, have mentored a number of people including our son - who from the mentoring has taken on responsibility as the Garden Moth scheme Recorder for Shropshire & Staffordshire.

- Yes, but only in the background of other activities.

- Yes, I believe so.

- The ability to mentor comes with time and experience. As stated previously, we have only scratched the surface when learning about invertebrates thus I personally would want to learn more before being confident to mentor. In the latter stages of the project, I was however able to give advice about the identification of certain species of coleoptera and some field techniques required.

- I have tried to help others to identifications where I was able, yes.

- I work at a school, and it has been great fun to pass on some of my newly gained knowledge to young budding entomologists!

- I suppose I have with varied success. I work closely with a group of interested people mainly from Telford so am frequently involved in identifying what they have found and trying to pass on some identification tips and other information if they are interested. I have not actively gone out to sell the taxa groups I am interested in.

- Yes, I have joined other groups who also have the aim of encouraging people to learn about the world of invertebrates.

- Only in a minor way.

- Yes

- Yes, I have started to offer support to others not involved in the IC project. I have assisting with obtaining keys, recommending publications, helping with identification and offering general support through e-mail and social media. I have also supported people attending conferences and meetings for the first time, arranging beforehand to meet up and then introducing them to others at the event.

- Only tutored a one off course, but have assisted people with follow up emails and queries

- Yes, this will have a knock on effect.

- Yes. From my young niece to adults in the local community. All have been interested about what I have learnt and then been able to share.

- Yes, as well as being a volunteer, I acted as a mentor for Diptera and aculeate Hymenoptera

- Yes I have been able to mentor (and encourage) other recorders in the groups that I have studied. However, for the reasons previously mentioned, I don't believe that I can do it to the standard I would like to achieve.

- Not quite mentor, but certainly help others with ID queries, especially in the field or even on iSpot and Flickr.

5) What value do you place on access to reference collections for species identification?

- Access to a reference collection is vital – one's own specimens, appropriate mentoring and the correct resources take trying to identify so far, but a physical specimen from which to observe detail is crucial – like medical student needs to touch patients.

- Reference collections are priceless (for everything else there is Mastercard). I learnt very early on in life that to have access to a reference collection, in any form of biological recording and study, is one of the most important assets to successful identification of voucher specimens. Few publications would ever be able to display the variation in a species, let alone a subspecies, in comparison to a single tray of specimens. Aside from using reference collections for identification, to be able to compare your voucher with one that is possibly over a hundred years old is a very humbling experience.

- I have probably underused this resource but it is useful.

- Some value. There are many more keys available than there were but it is always good to look at an actual specimen. I am not particularly enamoured with the reliance on photographs employed by some recorders

- The resource at PM would be very useful. I would hate to lose access to it.

- Vital for anything other than a few obvious groups. Difficult species/groups are not called difficult for no reason.

- Very high value - it helps enormously. You can't beat seeing something 3d in front of you!

- Access is crucial to enable proper identification. We have been so fortunate to have the facility.

- This is most useful to me as a winter activity, to prepare for the following season.

- Limited as rather too far to travel on regular basis but clearly important to have a Shropshire reference collection.

- A very high value.

- When using keys it is very useful to refer to correctly identified material to appreciate features. A reference collection is essential when separating critical species and even very experienced entomologists will use one frequently.

- These are key, together with individuals who can define the characteristics of critical species. Reference collections for Shropshire lepidoptera were historically very poor. Since 1972 I have compiled my own reference collection with data for macro and micro leps with many

new County records. We need a clear policy on where such valuable scientific collections can ultimately be housed after I'm no longer capable of recording. They will provide a good basis on which to build for the future. My micro collection was used extensively during preparation of the new Shropshire micro atlas.

- I personally did not use reference collections but if I came across a species requiring a voucher specimen or were doing more work with lichens or mosses I would place a very high value upon them.

- As part of IC challenge the specialist group trips to Museum reference collections have been a key part of the learning process, however expensive in time and money. The local reference collections now being developed will be a real bonus on knowledge /costs /and time fronts.

- Essential. Reference collections are sadly few and far between and need to be readily available if serious taxonomic studies are to be encouraged. One cannot rely on books alone!

- Haven't really used this facility.

- I wrote an article about this last year in the Shropshire Entomology Newsletter. If people do not have access to reference collections, identification errors can be made. These collections are invaluable and a necessary part of gaining knowledge in entomology.

- I personally have used this less than others, but I think it is vital to have a readily accessible resource like this. I have contributed a few specimens to it.

- I have found the collections to be extremely useful. Whilst studying for my MSc I used the collections at Preston Montford for several weeks. As a result of this I was able to achieve a First for this piece of work. Without having access to the collections I would not have been able to achieve this.

- In the early stages of learning about hoverflies and craneflies it was of immense value as I was able to look at a range of species to understand general characteristics and then more closely at specific species to see what makes species A different from Species B. Without a reference collection this would have been near impossible. As experience grew then it changed importance and provided the chance to check more difficult identifications against a verified specimen. A lot of work remains to be done on the reference collection but the environment and lack of easily accessible facilities discourages volunteers from giving their time and effort to do this work.

- I think it is important but would welcome more information about access and availability.

- Clearly important for difficult taxa

- High, but it has to be a reasonably complete and curated collection. I understand the collection from Silwood park is now at Harper - perhaps this could be of use?

- A high value, especially with difficult groups, such as the aculeates, with many similar species requiring examination of subtle features to identify them. I have been encouraged by how keen museum staff are to help and how pleased they are to accommodate you.

- Very high
- very important.
- Such access is important to give a feel for the diversity recorded in the field.
- Quite high - particularly the calypetrate Diptera that the project had determined by Steven Falk. These are a really useful reference for this difficult group of Diptera, for which reliably determined reference specimens are essential.
- A high value - it is impossible for one individual to collect all relevant species for their chosen group/s. So being able to access other collections is vital to fill in the missing gaps in your species familiarisation.
- Have not been involved much with the reference collections so can't say much about them, but knowing they're there is already a bonus as it means I have them as a back up anytime if needed.

6) Is there any technology you use as part of your biological recording activity? If so what? Is there technology which you would like to use but access to is limited by price, availability, or lack of training?

- To record, having found a specimen I use a microscope and resources in the form of texts. Whilst the microscope was expensive, it is the texts and image resources in digital format that pose most ongoing difficulty to acquire/purchase. Attending Invertebrate challenge workshops and meeting so many interested folks also attending led to my realising where resources could be obtained both through purchasing them and open source sites, here the FSC could learn to catch up with their creation of books and online/apps resources and then actually sell at the centres (that's a big missed trick!!).
- Being a bit of a technophobe, I was originally adverse to the use of technology for my recording endeavours. However, I soon came to realise, with the help of the IC project again, that the use of sites like IRecord can be utilised to submit a record very easily. I am seldom without a digital camera when I survey for invertebrates. A photographic image can easily be uploaded to IRecord or used as an aid for identification without having to collect a sample, in some cases.
- I use a microscope but it is not to the standard as those used by the project. Re magnification and lighting
- A binocular dissecting microscope and other optical devices. I have no lack of access to these. My computing skills are not good however and I find training tips too easily forgotten.
- Good microscope and light source. Plus pins and bits and bobs. I doubt I can afford a microscope as good as the ones at PM.
- Not really. A better microscope would be useful but too expensive at the moment.

- I would like to get into direct in-field/in-lab data entry via a recording application on a tablet, but I don't own a tablet! Also being able to take photos with a microscope might enable faster verification when you need to check with someone else, rather than having to pass them the specimen.

- Good microscopes have been very helpful. New and young

- I bought a gps to record location. The next leap forward will be keys and reference books and recording on an ipad.

- Usual internet id, guides, photos and general up-to-date info. Apps possibly but not yet used. GPS and maps useful for map references. Good if a IC Blog to post info and records on to.

- I use a camera and various on-line resources. At present, I do not require any further technology.

- I occasionally use a voice recorder for making notes in the field. The item I use the most is a digital camera for recording habitats. I think the subject that I would most like to find out more about is GIS and importing data into mapping programs generally.

- Different collecting techniques such as Malaise traps, modified leaf collectors for micro and other order collecting from herbage. Micro "tails", training required. Access to DNA testing Computerised recording/ mapping.

- I use a lot of online resources including iSpot and Facebook groups. I would like to use bat detectors with recording grasshoppers/crickets by their striations but would like some training in that first.

- For the detailed identifications involved specialist Laboratory equipment was essential - microscopes , lighting ,bench equipment and a place with good local reference material available .

- N/A

- Not really other than a spreadsheet with look-up tables produced by Nigel Cane-Honeysett and identification web sites freely available on the internet.

- You cannot successfully identify beetles without a microscope. So many species cannot be identified in the field. Microscopes are really expensive and I couldn't have submitted so many records without a microscope. In addition, the training course we attended was also crucial in learning about identification keys. Keys are extremely difficult to go through on your own if you have had no training / experience.

- My camera. And there is always more money that can be spent on camera equipment!

- Microscopes and irecord app for submitting records.

- A stereo-microscope is essential for identifying the taxa that I record. This is the most expensive item I have purchased. It is adequate but I would like a better one! However, I have to temper desire with the reality of cost. I make extensive use of a computer and

spreadsheet software. If I did not have these recording would, although not impossible, be more difficult and considerably more time-consuming. I do not have the ability to take good quality macro and microscopic photographs. This equipment or its availability at a local central location would be very useful.

- I use Excel for recording purposes that feeds into other technology which I am not familiar with.

- Good microscopes. I still don't feel confident with knowing which recording software is the best to use and how to use it.

- I still haven't purchased my own GPS unit due to lack of funding. Instead I use equipment borrowed from work or refer back to maps. I would be happy to purchase a GPS smartphone app but I'm not sure which would suit my needs or how accurate they are? This would be useful training information to provide to biological recorders.

- Access to the IC binocular microscopes has been essential for my course

- Microscopes/ knowledge.

- I use smartphone apps coupled with my inbuilt camera or use of my DSLR. Microscope use would be the most useful I think - and training to go with it.

- I use online keys, pdfs etc available from the internet. I'd really like access to a good microscope with macro-photographing facility and image stacking facility, to enable me to make images of key features as an aid to identifying critical specimens. A graticule set in a microscope, for measuring aspect ratio of key features on specimens would also be very useful.

- I have become pretty competent in using MapMate to log, analyse and map my records. One technology I would to use is GIS but availability and training is limited.

- My camera! I wouldn't be without it. I photograph everything I see so that any records can be verified. This also helps me to build a better picture (pardon the pun) of certain species through behaviour and observations. I currently use a Mac and do find it frustrating that there are no mapping softwares out there that work on a Mac. I also have an iPad and it's the same. I'd love to be able to use Mapmate for example for my records, but this isn't possible.

7) Do you think biological recording is too confined to a certain sector of society? How might FSC increase the age range or diversity of people involved? Is this important to you?

- It is important to me the biological recording is not so much restricted, rather practiced by only some folk. My take is it looks frightfully complicated all those dichotomous keys, I have no issue with the appropriate technical language, as long as a damned good illustrated glossary is attached. In these days of digital imaging the lack of exampling within texts puts folks off (see comments on mentor value earlier). Here as a publisher FSC ought to investigate the activities of the various recording societies - Dipterist Forum, other projects such as The Angela Marmont Centre at the NHM starting to photograph specimens, to offer

a more readily digestible identification resource. For us to be passing on our learning individually without FSC scale and traction is a bit tail wagging the dog.

- Having an old school view of “someone who is interested in a subject will find out about it”. I do not believe in huge advertising drives to boost numbers for numbers sake alone. The quality of the records are more important than a mass hype created by a full scale recruitment campaign. Therefore, it is of the utmost importance that the core of recorders are looked after, as their work will be a historical record of great benefit. Even if the majority do not yet think so.

- Yes, most recorders are in their later years and the long term future for recording is bleak. The FSC already does good work with young people and this is to be encouraged

- I think it is too confined with a large number of retired people involved. In our modern rather busy society I really do not know how the age range can be satisfactorily tackled. My own experience of many years is that the social diversity of those involved in recording has widened to some extent, but what positive steps can be taken to alter this further I find difficult to answer.

- Yes, but that may be inevitable. There is a danger in using, for example, easy ID apps to encourage more or younger people, but they are by no means comprehensive in their coverage, so wrong records could result.

- Seem pretty diverse to me already particularly in age range (have met from 15 to 80 on Invert Challenge / Bio Fells courses). Seems to me that an interest in the natural world is inbuilt to children, the problem is keeping it. Once you get beyond the likes of butterflies, birds, or flowering plants it gets more difficult. Take invert challenge into schools?

- I think if projects like IC where a more normal thing, rather than always being time-limited then there would be more opportunity for promotion amongst other groups of society. Also location is probably important. The Rea Brook exercise was great. Doing that, for example in a city park in Birmingham, would provide an opportunity to folk who don't seem to have much current access to hands on natural history learning. Really you'd have to ask the people who you feel are not currently attracted!

- Attracting new and young recorders is necessary for the future of biological recording. It is very important to me.

- Is it realistic to expect everyone to record, the chattering classes think so. Schools and especially universities should be doing much more. The FSC can help with free courses and mentoring local surveys and expanding the range of the fold out charts. Why is there no hoverfly one? These charts have been the starting point for much of my recording. Of course it is important it is the future.

- Yes, but better than it was. I think the sort of person who wants to record will come naturally, advertise more but for many the id skills needed especially the keys etc can be off putting. Need more younger people as most are retired.

- No. Recording is open to anybody with a little encouragement. Perhaps the FSC could involve schools with 'bug hunting days' to engage youngsters.

- It is somewhat, although not intentionally. Certain groups in society are not encouraged to think that natural history is accessible to them. Children enjoy natural history, but this interest has to be nurtured. The FSC should work more with school groups, as museums do. The diversity issue is partly to do with cultural perceptions that may be hard to address. I also think that cost of FSC courses precludes participation by those on a lower income, so becoming a more 'middle class' pursuit.

- Get involved with well established Societies such as the Lancashire and Cheshire entomological society where there are experienced entomologists but not the young people. Build liaisons with local schools at different age groups and course content. Biologists, chemists etc. It is important if knowledge is to be passed on.

- I think currently biological recording is too confined to older people (50+) almost predominantly white males. You could increase age range and diversity by running more outreach training and events in towns like Telford, Wellington and Shrewsbury and making it more accessible.

- Because of the knowledge required and lack of expensive personal equipment it is confined to access to specialist equipment. However the use of Citizen Science (ie records encouraged from the general public) has in recent years gathered extensive data and involved a very broad population -in particular the younger generation. It is essential to embrace this younger element to develop an interest in Bio recording. We have to find a bridge to link Citizen science records and Higher Level County Records and somehow publicise the links to maintain broader continuous involvement of the wider population.

- Whist not important personally, it would depend upon the market you wish to attract. Anecdotally, 'Nature deficit disorder' will need to be treated if numbers of field naturalists are to be maintained?? Young people should be encouraged. Cost is key here?

- Probably. Holding family events like a bio-blitz. Yes, we need to encourage young people to get involved.

- I do believe that biological recording is confined to a certain sector of society and this sector does tend care about natural history. The problem that you have is that the majority of society do not realise the importance of biological recording. I don't know how successful the UK ladybird survey has been as they have used social media and apps. People are now so obsessed with technology that you would need to look at developing apps that they could use for identification / recording. I have never been on a Bioblitz but perhaps more of these would be a good way of encouraging people to record? If you have mentors there, it would also help with identification. You could also have recording holidays (Biohols??), where you have a week of intense recording and a programme of events. I also think having more events at weekends would help with numbers. A lot of people work full time and do not have the option of attending recording events in the week. I must admit, I personally prefer the smaller groups of people who attend regularly and record. Of course, it is important to involve a range of people but it isn't personally important to me.

- Year one of all the IC courses contained several days held at weekends. This was quietly dropped from year two onwards, on my course at least. Bearing in mind that the initial stipulation for participation in IC was that students should be prepared to make a firm commitment to putting the time in to it, moving the goalposts so that people with full time jobs have to take a substantial proportion of their annual leave to cover all the days is unfair.

Biological recording in this country is substantially the preserve of the retired and there is concern that the population of amateur naturalists is ageing. More consideration should be given to those who are below retirement age.

- Incorporate learning identification skills in schools. To me this is crucial. There are a lot of children with the interest but no-one to help take forward and develop this interest. I also think that a link with colleges and universities that offer ecology type degrees would be very beneficial.

- Yes, it does seem to attract mainly men of a certain age. Children are very enthusiastic collectors but their attention span does not generally last long enough to include identification unless it is vey easy. There has to be a willingness to do this sort of activity. For the “general public” there needs to be taster days available which are local and preferably free of charge. Hopefully this will tickle the interest of some people, but there then has to be more structured learning available, free(like IC) or cheap to allow them to develop (or not) this interest. More formal and hopefully still free or cheap but probably more expensive training then needs to be available for the committed.

- I think peoples' available time is a factor and it seems that retired people make up a large number of recorders. By not having a project officer who maintains contact with all volunteers lack of communication could be an issue.

- Suspect this is down to geography. If you target the West Mids cities you'll probably get a more diverse audience but will you get the interest in these difficult insect groups?

- don't know

- Not in terms of age, I think there are a wide range of ages involved. The number of young people getting involved in biological recording and the demand for species identification training seems to be on the increase in this group. I think the cost of residential FSC natural history courses is often prohibitive. Some places on these courses should be subsidised or of a nominal cost to young people and full-time students. Especially if a planned course is running anyway with spaces remaining!

- No- just people with specific interests and time. As dragonfly VCR I think the key to getting people involved is illustrating accessibility which is where a group like dragonflies is invaluable. I think this 'easier' group should frequently be linked up with other harder groups so people can be encouraged to make a start which could lead to all sorts of other invertebrate recording interests. Future thought could be given to accessing younger people at A level age and presenting a range of interest groups and how to get involved

- More local group training

- Children must be engaged from an early age. They need to have a reason for the recording and it must be enjoyable.

- Yes it is very confined. I think this is so, because the equipment required for entomology (my main interest) is expensive and this prevents people getting involved. Access to things like microscopes, pooters, nets, specimen tubes, means that people can try out entomology, before making the commitment of buying equipment.

- I think more young people need to be involved. The older generation tend to be the majority of recorders and is essential that competent biological recorders are available for the future.

- Those of us with full time jobs are obviously restricted as regards time. Getting more people involved needs time. If the IC were to continue in the way it has for the last 3 years, more people would get to know about it and become involved. If it ends here and now, there will be nothing for people to get involved with and therefore no real incentive.

8) Is there anything you would have liked to have done as part of IC that you were not able to do? (Groups of taxa etc)

- The only additional aspect I would like to have undertaken was multiday events, before continuing yes there are dissuaders: time, cost and stamina. However a day in the field and the following day identifying the collected specimens interspersed with a talk/PowerPoint presentation would have been appreciated.

- If I had to compile a complete list of what I would have liked to do, it would be endless. It certainly is a case of the more you learn the less you know. I would like to have done more work on dissections for the purpose of species identification. I also feel that a workshop on labelling and how to creating a structured voucher specimen collection (possibly at a museum) would be useful. I would also have liked to learn more about report writing. This would help getting over the fear of putting out work that would be under the scrutiny of peers, some who have superior experience.

- I would have liked to have done more, both with the group that I studied and also tried some others. Unfortunately the project coincided with a very busy period

- I had my hands full with trying to tackle hover flies and crane flies.

- nothing springs to mind.

- Not at this time.

- No it was applicable to my interests.

- Water beetles to compliment the water bugs course, woodlice. I think for some taxa a basic course to get to family, at least then you ask google the right question.

- More on Coleoptera. Smaller Hemiptera

- No, I cannot think of anything else. The programme was very comprehensive.

- I would like to have carried out more Staphylinidae courses and visited more sites.

- To date the programmes have been very full and if they are to continue there are ecological studies that can follow naturally from the basic recording exercises. A time phased programme of development can follow from the basic data sets.

- I was sadly unable to do the earthworms and cranefly courses which I would have loved. I would also have loved to have done snails, centipedes and millipedes.

- Had the time to become more involved with Hoverflies , Hymenoptera
- True Bugs or Caddis would be good.
- No.
- There are many coleopteran families we did not touch on and those that we did cover, we only scratched the surface. I would have liked to have gone into the dissection and microscopy more. I also felt that some of the days could have been a bit more structured. I would have like to have had a field day in the morning and then go back to the classroom to identify our specimens. There could have also been a field day one day and a classroom workshop the following day.
- No.
- IC could not cover all subjects and it was complemented by Bio.Fell. I branched out quite early in the IC project into hemiptera. Although Shieldbugs were dealt with as part of IC the other main families were not. However IC did fund my attendance at courses to cover Auchenorrhyncha and attend Hemiptera Days at BENHS Dinton Pastures. IC also funded my attendance on the Bio.Fell Heteroptera training. I am very grateful for this additional funding and the training and contacts it enabled.
- Simply my lack of time, as a fulltime worker, for weekday activities has restricted the level of my involvement.
- I'm by no means expert on the invert groups I've been looking at so Im happy with the couple I've been working on.
- No
- Maybe hoverflies but it would probably have been too much to take on at the same time.
- No
- No
- Calypterate flies - Muscidae, Anthomyidae in particular, Smaller Acalypterate flies - the really small difficult ones! Sessions on dissecting insect terminalia would have been brilliant.
- Two taxa that I would liked to have done as part of IC are Empids (Diptera) and Sawflies (Hymenoptera).
- Would have liked to have had more on the Terrestrial Heteroptera.

9) Please estimate the number of biological records you have made AS A RESULT OF the training you've had (to the nearest 500 please)?

- In answering the question I would like to ensure I understand the question, my estimation comprises records from field trips as part of Invertebrate Challenge and of records taken purely of taxa I was not deliberately recording (not by catch) before my involvement with Invertebrate Challenge began and by dint of which I will need time and verification input before submitting the records. Many being taken individually to avoid being inundated with too much to manage or be intimidated by. My estimation is between 350 to 500 records, many still finalise to verification.

- Since the inception of the IC project I have submitted in excess of 600 records. These records were all a result of what I have learnt during the IC project.

- 500

- I don't think I've reached 500 yet, but things started to pick up this year.

- 2000

- not enough!

- 1000 +

- Almost all of my records were aggregated with those of the groups I have been out with and I have no idea of my contribution. Records I made in addition were some 500 in the year.

- Difficult as already recording before but the Atlas series make you look and record more as reason. 2-3,000 records year

- 500

- Approximately 1,000

- Not really sure but 5000++. It's not just the records but the observation/ analysis of the data to be used in future studies.

- About 500 across Shropshire, Staffordshire, Worcestershire and the Black Country.

- Over 22,000 records covering moths, butterflies, craneflies , spiders, beetles and birds.

- N/A

- Most of our IC records were noted collectively by the recorder of the day, so it is difficult to quantify our individual total, but probably less than 500.

- I am not from Shropshire but have travelled from Staffordshire to attend most of the courses. I have submitted approximately 600 records since the project's inception. I would never have submitted this amount without this project or without a mentor / project officer.

- 500 (actually 347 aculeates + 116 shieldbugs & allies = 463 Shropshire records, plus a few elsewhere. I am mostly limited to weekends.)

- I now work full time so do not get as many opportunities to create records. Whilst doing the training I submitted approximately 50.

- A difficult question. Over the past four years I have probably contributed well over 10,000 records. These are not all my own but IC has given me the confidence to arrange walks on which a group of us gather records mainly of invertebrates. Where necessary I will determine the species and I ensure that these records are submitted to the appropriate County Recorders.

- 500 directly to the Invertebrate Challenge plus more to other groups e.g. >500 for Lepidoptera as a result of the IC.

- 500

- 2500

- 1000

- NA, but people I trained have sent in exuvial records which is important.

- 1000 over numerous groups

- Very difficult to estimate, but at a guess 1,500

- About 1000.

- Maybe 1,500? Not entirely sure...

10) In a "throw those curtains wide, one day like this a year would see me right" (Perfect Day by Elbow) kind of way - was there a moment during in IC when you thought "wow" - please describe it?

- The observation of other taxa than those which I had gravitated towards (Diptera and Hymenoptera) whilst attending the Invertebrate Challenge gave me the confidence to volunteer to sort Malaise trap samples for the Diptera section of The Natural History in London. This was enabled by the exposure to many new taxa on the Invertebrate Challenge and complimented the attendance of Invertebrate Challenge as it saw me see specimens in the flesh that previously only been seen on the pages of books. The ‘wow’ moment lasted the three months I volunteered there.

- There were many “wow” days during invert challenge. The first was arriving at Preston Montford and knowing that we were going to attend such a beautiful school. Once in the classroom, seeing a voucher specimen under the microscope during initial training. A Carabid that looked spectacular to the naked eye was even more captivating magnified to 40x; I defy anyone not to marvel at the sight.

- Probably at the annual meeting when the new discoveries made in the county have been highlighted

- Getting kissed by Pete after finding a heather shield bug on an otherwise wet and miserable day.

- No, sorry! Was evenly enjoyable all the way through, thank you.

- Too many to mention! I'll pick one: Seeing the "finger print" marking on the thorax of one of the cranefly species for the first time.

- When I recorded the third record for Wales, and found it in my County. ...well my garden. It shows how under recorded the group are. Transference of skills - fabulous!

- Oh dear, so many. My improving hoverfly skills, Longhorn beetles at Dudmaston, Essex skipper at Rea Brook Valley. The slug id day, using the new slug guide.

- Seeing the Atlas series published.

- Yes, when I recorded an insect which was found in the same area in Shropshire as the last record in the 1930's.

- There have been several such occasions. The latest was on publication of the Rea Brook report when it became evident just how much data small number of recorders could produce.

- The annual get together at Preston Montford. The training day on micros and the celebration lunch as we completed the last tetrad for the whole of Shropshire micro recording.

- Definitely learning to tell the difference between Arion ater and Arion rufus by poking them with a lollypop stick and seeing which one dances.

- At last year's IC day it was staggering to see the extent of advances made within the Shropshire Biodiversity records . Hopefully this year's event will be equally staggering with extended coverage of tetrads within the County and the culmination of all the targeted Shropshire Atlases. Also seeing and finally identifying trichobothra on the rear legs of a money spider!

- A Shropshire Entomology day - Brilliant! I hope it is maintained in the future.

- A bird cherry tree in blossom on 16 April 2014 in the Rea Brook valley which was a hot spot for ladybirds, mostly harlequins. Every branch seemed to have a little colony.

- I have to be honest and say that there were many days that were wow moments for me. Just being able to find a beetle and keying it out to a species has felt like a major achievement. One particular wow moment however, was when we went to Eardington Quarry. It was a different habitat and I had found some different species; some of which were fantastic finds. I cannot describe the excitement in finding a species that hasn't been recorded for many years. This is why this project is so so important. It was because of this project that I submitted a ladybird record that hasn't been recorded in Shropshire for 40 years! You cannot monitor populations properly without this kind of data and the only way of ensuring that it is collated is by this kind of project. The project has enabled me to attend training that I wouldn't have been able to afford and in return I have made a significant contribution to

biological recording. I believe it would be a tragic mistake for the FSC to not continue with invertebrate projects and to not allow Pete to remain as a Project Officer. He has truly made the last three years a complete joy and has been such a huge help. I am going to miss it so much.

- Probably the very first field day, a perfect Spring day on Wenlock Edge, surrounded by more species of solitary bee than I knew existed. I was hooked.

- When I was able to correctly identify specimens using the methods that I had been taught. I knew that without the IC workshops I would not have been able to achieve this.

- I think it was one of the very first course days I attended when Pete Boardman was introducing us to various collecting techniques at Preston Montford. He collected a handful of leaf litter from the side of the path by the car park, threw it into a tray and it was full of life – what could be more enlightening and exciting?

- When I became involved in helping to organise the voucher collection. I thought wow, I know so little but also wow, I want to know and learn more.

- Not one moment but rather the feeling I had of a group of friends getting together to make discoveries that most people outside of all this just wouldn't appreciate

- Watching dozens of beetles running around and flying in to a patch of wet mud on the edge of an overgrown pond in Rea Brook Valley.

- No single moment but the whole experience has been a great big melting pot of exciting new species, friendly like-minded people, good laughs, amazing sites and sharing of knowledge. This has led to an ongoing desire to learn and to share that knowledge. I actually feel quite emotional and privileged to have been part of it. Thank you!

- When I had an oversubscribed dragonfly larval course with 7 (!) on the waiting list!!!

- Most events fell into this category.

- I often thought "WOW!". Overall, I think this was simply due to opening my eyes to the sheer diversity and specialist features of insects.

- Probably any of the days on which like minded folk gathered in the field, collected various invertebrates, came together to compare notes and kept each other up to date (later) with findings form the day. E.G. some of the Reabrook Valley general invertebrate recording days. To be fair though - one day of that type each year would not be enough! But say four or five would.

- There wasn't a single day. Every day of the IC had a "wow" moment when I learnt something fascinating that I hadn't known previously.

- I love that song!! :-) Possibly getting involved with the atlases. It was utterly captivating to follow the progress of the recording and the accompanying maps when we helped to put the Shieldbug & Allies atlas together. This motivated me so much more to get out in the field whenever I possibly could to record sightings! Nothing better than a sense of purpose to get

you going! That's exactly what the IC has done for me! It has opened my mind (and eyes) to a whole new spectacular world!