

Engendering a New Generation of Wildlife Recorders: An Oxford Brookes University project funded through the Heritage Lottery Fund

April 2006 – April 2007

Project Officer: Lynn Hughes

Background

In 2004, researchers in the School of Life Sciences at Oxford Brookes University decided to look into ways of addressing the dual issue of declining taxonomic skills in undergraduates and lack of availability of species data. One suggestion, especially with the aims of motivating students and improving efficiency of data collation in mind, involved making use of newly emerging mobile technologies (especially handheld computers [PDAs] with integrated GPS). However, it soon became apparent that there was little relevant software available for the PDAs. The first 'WildKey' software - a user-friendly, digital key and recording package for British butterflies which operates on PDAs- was therefore created by the Oxford Brookes team.

In 2006, following a small-scale trial of the butterfly software with Lord Williams's School, Thame, a Heritage Lottery Fund grant was awarded which enabled the software to be more extensively piloted over twelve months and its value as a learning tool assessed. In collaboration with four partner organisations (Field Studies Council, Natural History Museum, Pond Conservation and Woodland Trust) four further software packages were developed for use during this trial process, respectively: playing field plants; woodlice/ladybirds; pond animals; and common tree leaves.

The software provides a series of simple, image-led prompts via which users progress through a multi-access key and, in usually fewer than six steps, arrive at a suggested species (see www.wildkey.co.uk for desk-top demonstration versions). Users can check their identifications by accessing information on the species' distribution, status and look-alikes and if the user decides the identification is correct, standard recording details and grid references can be logged. Data can be uploaded to a desktop computer and maps or graphs produced.

This report aims to summarise the achievements and findings of the Heritage Lottery Fund / Oxford Brookes University project and to describe the methods so that any related future studies can draw on the experiences of this project.

Summary of achievements / benefits

Educational achievements and benefits

- 47 free workshops were completed which involved 1163 people;
- 1163 people were given access to state-of-the-art learning tools;
- Participants learnt skills in IT;
- Participants learnt skills in wildlife identification and recording;
- Participants were given the opportunity to learn outdoors; some in their school grounds and some at local wildlife sites. 27 of the 47 workshops took place at local wildlife sites to which participants may not have visited or previously have been able to access (see Appendix 3);
- Parents who attended workshops had the opportunity to help their children carry out the workshop tasks and to themselves learn IT skills and about wildlife identification;
- Teachers were provided with information and resources to enable them to continue involving their students in biological identification and recording;
- Teachers were given the opportunity to share details of the biological records collected by their pupils through the project website;
- Group leaders, partners and other interested parties were given the opportunity to attend a 'wrap-up workshop' in December where project findings and outputs were presented and attendees were provided with free WildKey software so that similar activities could be carried out beyond this project's duration.

Other achievements

- The project has succeeded in augmenting the species records for the area. 2832 biological records were collected by project participants. These records were shared with participants through the creation of a website.
- The project was given press coverage following the discovery, by a group of children taking part in the project, of a rare ladybird in the grounds on the Natural History Museum, London. The story appeared in the Oxford Times and Oxford Mail (see Appendix 1) and was covered on ITN Central's six o'clock news bulletin. The workshop took place on 26 September 2006 and the school involved was Cherwell School, Oxford. The ladybird, an Australian species only once before recorded in the UK, and therefore not included in the common ladybirds key, was recognised by the students as not being in the database and so they reported their finding to the Project Officer. The ladybird was taken to beetle specialists in the Museum who identified it as *Rodolia cardinalis*, which was resident in the gardens but which had not previously been recorded.
- Video footage of a butterfly workshop was screened at WildScreen – the international wildlife and environmental film festival. The event was presented by Alan Titchmarsh and attended by Sir David Attenborough. The showing of this video was a result of WildKey software's nomination for an 'interactive media' award.
- The results of the project were presented at Invertebrate Link 2006 – a national conference, attended by more than 100 delegates, hosted by the Natural History Museum, London. The conference aimed to address the recruitment of the next generation of invertebrate specialists. A written version of this talk will appear in Antenna – the Bulletin of the Royal Entomological Society in 2007. The Project

Officer also attended the National Biodiversity Network conference in London and the Berkshire Biological Recorders Forum annual meeting where much interest was generated amongst regional and national biological recording organisations.

Workshops

Wildlife identification and recording workshops

Over the course of the ten-month project, 47 workshops were timetabled and conducted (see Appendix 2 for the names of the schools / groups that participated). Each workshop lasted between 2 and 2.5 hours. A number of workshops took place within school grounds, however, many groups took the opportunity to travel to field sites in Oxfordshire, Buckinghamshire or London (see Appendix 3 for a list of these field sites).

Workshop participants:	
Children (aged 6-14)	937
Adults	10
Workshop supervisors / participants:	
Teachers	59
Parents and teaching assistants	157
TOTAL	1163

Table 1: number of participants by group

Type of group	Number of workshops
Primary schools	31
Secondary schools	10
Cub-scouts	2
Adult volunteers	1
Individual members of the public (not members of a particular group)	3
TOTAL	47

Table 2: number of workshops undertaken by each type of group

Due to bad weather, the final of a three workshop series at North Leigh Common (see below) had to be cancelled. On one other occasion, the weather made it impossible to collect examples of the wildlife group of study (butterflies) and the workshops had to be continued with pictures of butterflies. On all other occasions participants were able to identify live specimens.

Number of workshops attended by each participant

For the majority of workshops (36 involving 837 children), participants only took part in one workshop. However, for the 11 remaining workshops (100 participants in total) children took part in either two or three consecutive workshops: at North Leigh Common, each child took part in three consecutive workshops; and between March and April 2007, four sets of two consecutive workshops were carried out (also see below).

Hardware

The PDAs used during the project included the MIO 168 DigiWalker, Fujitsu Siemens Pocket Loox and the Fujitsu Siemens EDA.

Project 'wrap-up' workshop

This took place at Oxford Brookes University on 7.12.06. All group leaders involved up to that point and selected children were invited (see Appendix 4 for invitation). Fifteen teachers and 10 children were present at the event. The event was also attended by partner representatives (Pond Conservation and Field Studies Council), members of the local County Council ICT Team and members of local wildlife / biological recording groups.

The results of the project were presented to all in attendance. Free WildKey software was distributed (woodlice / ladybirds key) and training was provided for all attending on using the software and identifying woodlice.

Prizes were given to the five children in attendance who had correctly identified all five species on the questionnaire at the end of the workshop; these children received a set of equipment for studying invertebrates in the field.

All group leaders who were not able to attend the final workshop were informed by email that the records were available online and it was requested that all participating children be informed that they could view their own records on this website. Children who had not been able to attend the final workshop but had identified the five species on the questionnaire correctly were each sent a copy of the Field Studies Council fold-out identification charts relevant to the wildlife group they had studied.

Evaluation: Method

Video

A number of workshops were filmed to capture the response of children to the experience.

Project Officer's observations

As a qualified teacher and experienced environmental educator, the Project Officer was well-placed to make evaluations of the usefulness of the WildKey software.

Questionnaires

Questionnaire to participating children before and after workshop (see Appendix 5 for example).

Through asking children to name common species and answer a series of questions, this aimed to assess:

- a) to what extent children learnt to identify common wildlife species during the workshop;
- b) which wildlife-related activities or clubs had children been involved with prior to the workshop;
- c) to what extent children enjoyed the handheld learning experience;
- d) whether the children found the software easy to use or not;
- e) whether the children felt the experience might encourage them to take part in similar activities in the future.

Through inviting children to comment on their experiences, a bank of qualitative data was also collated which represented children's feelings and opinions about the experience - see Appendix 6.

Questionnaire to participating teachers (see Appendix 7).

This aimed to gauge professional opinions on the following:

- a) to what extent the learning experience was worthwhile;
- b) to what extent the PDAs and software assisted learning;
- c) to what extent the PDAs and software motivated pupils;
- d) whether the digital keys were easier to use than paper-based field guides;
- e) whether teachers would feel more confident in biological fieldwork if they had access to digital keys;
- f) whether teachers would be more likely to undertake lessons involving biological identifications if they had access to digital keys;
- g) what factors were obstacles to teachers undertaking more fieldwork with their pupils;
- h) whether they were likely to build on the workshop experience back at school.

Through inviting teachers to comment on their experiences, a bank of qualitative data was also collated which represented teachers opinions about the experience - see Appendix 8.

Children participating in consecutive workshops

The questionnaires used for teachers were the same as described above, but teachers were only asked to complete the questionnaire at the end of the final workshop. The details of the method and evaluation for these workshops is given below.

North Leigh Common – butterflies, trees and ladybirds

Children were given the opportunity to take part in one set of three consecutive workshops. However, the third had to be cancelled on the day due to bad weather. Therefore the eleven children who took part were tested before the first workshop and then after the first and second workshop. They were provided with pictures of twelve butterfly species, twelve tree leaves and ten ladybird species and asked to name them (see Appendix 9 for lists of these species).

March and April 2007 – minibeasts / woodlice

Each student took part in a series of two workshops. Eight workshops involving four schools took place during these months. Each student had the opportunity to use a newly developed 'minibeast' key.

For three classes (involving Y5 & 6 pupils), the first workshop of the series focused on general minibeast identification. The second workshop focused specifically on woodlouse identification, using the WildKey woodlouse and ladybird package developed with the Natural History Museum.

For the one Y3 group involved in the study, it was decided that, due to ability and lower age, the focus of minibeasts should continue throughout the first and second workshop. Therefore the evaluation of these Y3 minibeast workshops is reported separately below.

At the start and end of the three minibeast sessions, pupils were tested on their ability to correctly name eight common groups. At the start and end of the woodlice identification sessions they were asked to name five woodlice species (see Appendix 10 for lists of these groups).

Evaluation: Results

- **92% of students said they enjoyed using the handhelds to identify wildlife**, 5% said they 'sort-of' enjoyed using WildKey and 3% said they did not.
- **80.5% said they found WildKey easy to use**, 13 % said they 'sort-of' found WildKey easy to use and 6.5% said they did not find it easy.
- **49% of participating children said they would be more likely to be involved in naming and recording wildlife in the future and 30% said they would consider becoming more involved** indicating a heightened interest. Children's written comments revealed the vast majority found the workshops enjoyable and also indicate that interest has been heightened (see Appendix 6).
- Observations during the workshops showed that focused by the technology, **the large majority of students remained on-task, closely observing and identifying species, for entire 60 to 90 minute sessions**. This observation was supported by teachers' overwhelmingly positive recorded opinions (see table 5) and their written comments (see Appendix 8) and was also supported by the video evidence

Identifications: Children participating in a single workshop

- 837 children took part in the evaluation process described here.
- Out of a total of 4185 possible correct answers (837 children x 5 species) 709 correct answers were recorded before the workshop (16.9%). Table 3 shows this data in further detail:

No. correct identifications	0	1	2	3	4	5
% children	45.9	40.6	8.1	4.5	0.9	0

Table 3: % children correctly identifying species on the questionnaire prior to the workshop (n= 837)

- Out of a total of 4185 possible correct answers (837 children x 5 species) 1914 correct answers were recorded after the workshop (45.7%). Overall this represents a **170% increase in correct identifications** at the end of the workshop compared to the beginning. Table 4 shows this in further detail:

No. correct identifications	0	1	2	3	4	5
% children	25.6	31.0	25.4	11.6	5.2	1.2

Table 4: % children correctly identifying species on the questionnaire after the workshop (n= 837)

The comparison between table 3 and table 4 shows that after the workshop, fewer children could recognise only 0 or 1 species, and more children could correctly identify 2, 3, 4 and 5 species. 74.4% of students had learnt to correctly identify one or more species new to them when tested at the end of the workshop and 18.4% were able to identify three or more species new to them..

Identifications: North Leigh Common – butterflies, trees and ladybirds

	Day 1 (What they knew before starting)	Day 1 (What they knew after the first session)	Difference in % correctly identified	Day 2 (what they knew after the second session)	Final difference in % correctly identified
Mary	7 (21%)	9 (26%)	5	13 (38%)	17
Jack	2 (6%)	7 (21%)	15	12 (35%)	29
Codrin	1 (3%)	8 (24%)	21	16 (47%)	44
Eleanor	7 (21%)	11 (32%)	11	17 (50%)	29
Poppy	1 (3%)	2 (6%)	3	5 (15%)	12
Thomas	2 (6%)	7 (21%)	15	11 (32%)	26
Sam	2 (6%)	8 (24%)	18	12 (35%)	29
Dom	2 (6%)	7 (21%)	15	13 (38%)	32
Liam	1 (3%)	3 (9%)	6	6 (18%)	15
Jiawen	1 (3%)	9 (26%)	23	12 (35%)	32
Matt	1 (3%)	7 (21%)	18	12 (35%)	32
TOTALS	27	78		129	

Table 7: participants' total correct identifications out of a total of 34 possible correct answers (n=11)

- On average children scored 2.4/34 (7.1%) correct identifications before the workshop, 7.1/34 (20.9%) after one day and 11.7/34 (34.4%) after two days.
- Overall, a **378% increase in correct identifications** at the end of the 2 workshops compared to the beginning was recorded (c.f. 170% for the 36 workshops analysed above).
- The results show that children may benefit greatly, in terms of gaining skills in biological fieldwork, from undertaking a series of fieldwork experiences; these results suggest there may be a cumulative effect where students are able to learn identifications more effectively the more practice they get.

Identifications: March and April 2007 – minibeasts / woodlice

Y5 & 6 minibeast sessions evaluation

Out of a total of 560 possible correct answers (70 children x 8 species) 305 correct answers were recorded before the workshop (54.5%). Table 8 shows this data in further detail

No. correct identifications	0	1	2	3	4	5	6	7	8
% children	2.9	1.4	12.9	12.9	21.4	20	18.6	7.1	2.9

Table 8: % children correctly identifying ‘minibeasts’ on the questionnaire prior to the minibeast workshop (n= 70)

Out of a total of 560 possible correct answers (70 children x 8 ‘minibeasts’) 351 correct answers were recorded after the workshop (62.7%). Overall this represents a **15% increase in correct identifications** at the end of the workshop compared to the beginning (z test reveals this increase is statistically significant within 99% confidence limits). Table 9 shows this in further detail:

No. correct identifications	0	1	2	3	4	5	6	7	8
% children	2.9	1.4	1.4	2.9	17.1	15.7	24.3	21.4	12.9

Table 9: % children correctly identifying ‘minibeasts’ on the questionnaire after the minibeast workshop (n= 70)

The comparison between table 8 and table 9 shows that after the workshop, more children could correctly identify 6, 7 and 8 species. However, the increase in correct identifications at the end of the workshop compared to the beginning is not nearly as marked as in table 3 and table 4 (above). The difference in sample size should be noted, but it is due to the more simplistic nature of the minibeast key which requires children to identify species only to a rudimentary level (millipede, spider, moth etc). Many more children were able to score highly before the workshop, thus perhaps reducing the impact the WildKey experience could have on learning / identification ability.

Y 5 & 6 woodlice sessions evaluation

Out of a total of 340 possible correct answers (68 children x 5 species) 73 correct answers were recorded before the workshop (21.5%). Table 10 shows this data in further detail

No. correct identifications	0	1	2	3	4	5
% children	35.3	58.8	4.4	1.5	0	0

Table 10: % children correctly identifying species on the questionnaire prior to the woodlouse workshop (n= 68)

Out of a total of 340 possible correct answers (68 children x 5 species) 122 correct answers were recorded after the workshop (35.9%). Overall this represents a **67% increase in correct identifications** at the end of the workshop compared to the beginning (z test reveals this increase is statistically significant within 99% confidence limits). Table 11 shows this in further detail:

No. correct identifications	0	1	2	3	4	5
% children	1.5	39.7	26.5	19.1	8.8	4.4

Table 11: % children correctly identifying species on the questionnaire prior to the woodlouse workshop (n= 68)

The comparison between table 10 and table 11 shows that after the workshop, more children could correctly identify 2,3,4 and 5 species. The increase in correct identifications at the end of the workshop compared to the beginning is over four times greater than in table 8 and 9 (above). This supports the argument that a greater degree of learning can occur when children know very little of species names prior to the workshop. Few children were able to score highly before the workshop and the learning during the sessions was more pronounced than in the minibeast sessions above.

Y 3 minibeast sessions

Pupil number	Day 1 (What they knew before starting)	Day 1 (What they knew after the first session)	Difference in % correctly identified	Day 2 (what they knew after the second session)	Final difference in % correctly identified
1	1 (12.5%)	1 (12.5%)	0	3 (37.5%)	25
2	0 (0%)	2 (25%)	25	3 (37.5%)	37.5
3	1 (12.5%)	3 (37.5)	15	7 (87.5%)	75
4	6 (75%)	8 (100%)	25	8 (100%)	25
5	4 (50%)	7 (87.5%)	3	7 (87.5%)	37.5
6	0 (0%)	2 (25%)	15	5 (62.5%)	62.5
7	0 (0%)	3 (37.5%)	18	7 (87.5%)	87.5
8	3 (37.5%)	3 (37.5%)	15	5 (62.5%)	25
9	2 (25%)	2 (25%)	6	3 (37.5%)	12.5
10	0 (0%)	2 (25%)	23	3 (37.5%)	37.5
11	0 (0%)	0 (0%)	18	1 (12.5%)	12.5
12	2 (25%)	2 (25%)	0	2 (25%)	0
TOTALS	19	35		54	

Table 12: Participants' total correct identifications out of a total of 8 possible correct answers (n=12)

- On average children scored 1.6/8 (20%) correct identifications before the workshop, 2.9/8 (36%) after one day and 4.5/8 (56%) after two days.
- Overall, a **184% increase in correct identifications** at the end of the 2 workshops compared to the beginning was recorded.
- Again, the results show that children may benefit greatly, in terms of gaining skills in biological fieldwork, from undertaking a series of fieldwork experiences (cf table 7 above); again these results suggest there may be a cumulative effect where students are able to learn identifications more effectively the more practice they get.

Teachers

Question number	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q1 This was a worthwhile learning experience for your students	82	18			
Q2 The handheld computers assisted learning	79	21			
Q3 The handheld computers motivated the students	91	9			
Q4 The students found the digital keys easier to use than they might find traditional field guides	63	32	5		
Q5 As a teacher, would you feel more confident about identifying species if you had access to user-friendly digital keys?	57	38	5		
Q6 Would you be more inclined to do biological fieldwork with students if identifying species was made easier?	58.3	33.3	5		3.3

Table 5: % responses of participating teachers (n=61)

- The responses showed that 100% of teachers questioned teachers believed this learning experience was very worthwhile, that the PDAs and software did assist learning and that pupils were motivated by these learning tools. The vast majority (95%) believed the digital keys were easier to use than traditional field guides and that access to these digital keys would increase their confidence in carrying out such work with their own students. 3.3% of teachers strongly disagreed they would be more inclined to do biological fieldwork if identifying species was made easier. However, when questioned, these teachers stated this was because they were already confident in their own field skills.
- The EDA was continually cited as the machine teachers would choose to buy if given the funding. The main reason given its physical robustness which teachers felt would give them confidence when using PDAs with students.
- **53 of the 61 teachers involved stated they aimed to build on the experience back in the classroom** and communications have been received that many teachers have put this into action. For example, children from Harwell Junior School continued to search for invasive harlequin ladybirds in their school grounds over the summer and logged their records on the Harlequin Survey website, while Northbourne Primary School pupils decorated their classroom with artwork inspired by the workshop.
- Teachers were asked to tick any of the potential obstacles to fieldwork they had encountered. 39% of teachers stated a lack of confidence in fieldwork is an obstacle to them undertaking such activities with their students (see table 6). This suggests that teaching tools which can help increase confidence (and evidence from this project also suggests WildKey software is such a tool) are important in encouraging more fieldwork in schools.

Possible obstacle	% response
Curriculum pressure	54.2
Cost	45.8
Lack of confidence in fieldwork	39.0
Reduced fieldwork in the curriculum	25.4
Health and safety concerns	22.0
Getting cover	18.6
Timetabling pressures	22.0
Behaviour management	15.3

Table 6: teachers' obstacles to undertaking biological fieldwork with school groups (n=59)

Evaluation: Discussion

The timing, structure and outdoor location of the workshops meant that evaluation activities had to be undertaken easily and quickly. As such only five species were included in the evaluation sheets. Although this made the exercise more practical, we often would not see all five species during any particular workshop. While it might have been good to include more species in the questionnaire (to increase our chances of sightings of species included) the extra time needed for children to complete a longer questionnaire could have led to difficulties – often the questionnaire had to be completed very quickly at the end of the session. It may also have been useful to ‘tailor’ evaluation sheets to a particular field site, though it would have been difficult to properly predict which species would be encountered on any one day. Furthermore, in order to compare results across all the participants, it was decided that there were advantages to testing all participants (who used a particular key) on the same five species.

Where questionnaires were completed by children on clipboards in the field, there were issues with copying. It was attempted, as far as possible, to sit children away from one another while they completed the questionnaire but in a field situation this was often difficult to control.

A number of the above issues might be overcome in future by creating a digital questionnaire which would allow children to more quickly answer questions (perhaps through multiple choice) and would ensure more independence in the answers given.

There was some flexibility in the marking of answers – for example, ‘ash’ was allowed for ‘common ash’. However, some learning was not represented in this marking; for example, following the workshop, children would often name a species they previously did not know or write down prior to the workshop, with the name of a similar (but incorrect) species which was encountered during the workshop. Similarly, incorrect answers written down prior to the workshop would often be recognised by the child as incorrect following the workshop, even though they still did not know the actual name of that species. Also, if children did not encounter a particular species shown on the questionnaire but encountered a similar one (e.g. the orange ladybird is similar to the cream-spotted ladybird) they would write the name of the similar species encountered after the workshop. These examples show that learning might have been occurring which is not necessarily accounted for in simply marking answers ‘right’ or ‘wrong’.

It was hoped that it would be possible to follow-up each initial evaluation with a second questionnaire to evaluate how much knowledge children had retained over a longer time period (e.g. 4 months). Due to time constraints and the pressures teachers are under in January, it was decided to involve just five schools whose teachers had agreed to ask their students to complete the questionnaires. Unfortunately, despite this agreement, only two lots were returned to the project office, giving little to work on in terms of ‘evaluation follow-up’. Comments made by these five teachers to the Project Officer illustrate the lack of returned questionnaires reflects the pressures of teaching, rather than any lack of enthusiasm for the project!

The questionnaire to children included a question asking children which wildlife-related activities or clubs they had been involved with prior to the workshop. This question was included in case this sort of follow-up had been possible on a wider scale; it would have been interesting to see if there was any measurable change in or effect on children’s

behaviour as a result of their involvement with the project. However, for the reasons given above, it was not possible to follow this aspect up.

Had time allowed, it would also have been very interesting and useful to study the differences between teaching field skills using paper-based field guides and using digital keys. This would have provided useful information on the relative importance of children having access to digital keys for such activities.

Biological data

The project has succeeded in augmenting the species records for the area. 2832 biological records were collected by project participants. These records were shared with participants through the creation of a website. Go to www.wildkey.co.uk, click on 'In Action' then 'Heritage Project' and follow the link to 'results homepage'. Please visit this website to view record details.

Through this website, participants are invited to view their records in a number of ways:

- They can choose a particular wildlife group (e.g. butterflies, pond animals) and view maps showing the records for the species in that group. Data is also provided on the field site grid reference, the date the recording was made, which group the recorder belonged to and the name of the recorder;
- They can click on their group name and see a list of all the species recorded by their group and the names of the recorders. If a particular species is clicked, the website links to Google images making it possible to immediately see images of that recorded species;
- They can view a list of the numbers of animals and plants recorded at each site;
- They can view a list showing how many times each species was recorded.

Through this website, it is also possible to view records in Google Earth, providing an exciting and more 'realistic' way for children to visualise their findings.

Problems encountered / issues to consider in future work

- Due to the time restrictions involved in biological fieldwork (e.g. pond animals are best studied in April, May and June) it is necessary that enough time is planned before this period to timetable the workshops. The Project Officer's start date of 10.4.06 meant that time was tight in the project planning and workshop timetabling phase.
- Working with schools is beneficial in that pools of potential participants can be quickly identified and contacted, but the lack of flexibility in the schools' system can be problematic – teachers often require months of notice to prepare for trips outside school.
- The time constraints of this project dictated, to some extent, that schools be used to timetable the majority of the workshops and though there were considerable advantages to this (e.g. as detailed above), teachers were willing to organise involvement in only one-off workshops at such short notice; arranging consecutive workshops with the same school group is often very problematic mainly because time is so tight in the curriculum. On the positive side, this meant that many more people were given the opportunity to be involved than was initially planned.
- Working through organised groups such as schools also proved beneficial in that the systems were in place to allow sufficient Health and Safety measures to be put in place in a short time frame; for example, teachers were able to carry out risk assessments on behalf of their own groups. The Project Officer was responsible for all H&S aspects of the three workshops run with individual members of the public and the large increase in workload required to fulfil this would not have been possible in the short time frame the other workshops had to be completed in.
- The requirement for CRB checks for all adults working with children severely restricts the possibilities of using adult 'amateur naturalist' volunteers as a resource in educating children; especially in a short-term project. Identifying and encouraging involvement of adult volunteers takes considerable time and CRB checks can take over eight weeks to be processed. In addition to a short field season, this can make involving volunteers impracticable.
- The validity of records was less certain than would have been the case if individual participants had been given the chance to hone their identification skills over a series of workshops. When individual participants are given the opportunity to take part in more than one workshop, their identification skills develop rapidly (see 'Children participating in consecutive workshops' above). In future, PDAs which have integrated cameras could be used to enable children to take 'voucher' photos of specimens they have recorded and thus allow further verification of records.
- Given more time, it would have been interesting to follow-up the workshops with a longer-term study of how much knowledge the children had retained and whether there was any evidence for a change in attitudes / behaviours as a result of involvement in such a project. This was attempted towards the end of the project but teachers did not return questionnaires and the project concluded before this could be resolved.

General conclusions

Teachers agreed that WildKey provided a worthwhile learning experience and motivated their students. They also agreed that it provided an improvement on paper-based keys and that access to such a resource would enhance their own confidence in leading wildlife identification sessions with their pupils.

Children certainly learned to accurately identify species through using the software and overall a 170% increase in correct species identification was recorded. The vast majority (92%) said they enjoyed the experience which was certainly supported by their written comments (see below). Half (49%) of the children involved stated they would be more likely to have a go at identifying wildlife in the future, indicating the motivation might have continued beyond the workshop experience.

The motivational effects of the technology facilitated an increased time engaged in wildlife identification and recording. This effect was noted across abilities by teachers, for example:

‘Every student feels they have learnt something’
Bladon CP School, Carolyn Thorne

‘Motivated a fairly difficult group’
Caldecott Primary School, Linda Denoon

‘The children were instantly engaged (and) enthused by the PDAs... there were no behaviour problems despite two children having regular behaviour issues. An immensely useful activity’.
St Amands, John Laverty

‘The less motivated children were definitely more on-task using the handheld computers’
Middle Barton School, Alison Humphries

‘All the children I spoke to were enjoying it and were engaged in the activity’
Field Studies Council, Liz Farman

‘Students said they felt ‘clever’ because the key enabled them to identify plants more easily. In my opinion they concentrated far longer and were more motivated than with ordinary keys – particularly considering the weather’
Field Studies Council, Jackie Rham

‘Enjoyed by all students’
Cherwell School, Maria Selby

‘The children were highly motivated throughout the session’
Harwell Primary School, Nicola Morrow

In utilising the latest innovations in mobile technology, WildKey has great appeal for children and young people. This can be seen in many of the comments received from them during the project, for example:

'It was the greatest science session ever!'

'I liked it a lot especially the computers'

'It was different and better than sitting in a classroom and the computers were cool!!!'

'The computers made it a lot easier and funner'

'Thanks I had a really great time and I will have another go in the future! If I was allowed to do it again I would'

'I really enjoyed the workshops especially the handheld computers'

'A really good time out there with you and the PCs are really good with WildKey'

'This was brilliant!!!'

'I did like the workshop because we got to use the computers'

'I enjoyed using the computers for researching'

'Using the PDAs is loads of fun'

'I love the mini computers!!!'

'Thank you so much for letting us use the handheld computers. They're cool!'

'I think I will go out more to identify wildlife'

WildKey is a relevant learning tool for children and young people, and one with which they are immediately confident and proficient. As such, it has the potential to involve children who, without such a resource, might not *ever* have become involved. Whereas in the past, children who became interested in wildlife and biology probably had that tendency within them (perhaps having been encouraged by parents or friends), through technology, WildKey can potentially help provide that initial 'spark' of interest and enthusiasm for a much wider range of children.

For a number of reasons, not least the continuing decline in numbers of young people involved in biological identification and recording, and more broadly, the decline in numbers of young people who are given encouragement or who have the opportunity to discover their local wildlife, it is crucially important that biological tools are developed which appeal to this new generation of 'techno-kids'. The evidence from this project is that WildKey is such a tool. Furthermore, with the evidence for enhanced involvement of children of all abilities (both in numbers of children taking part and in motivation /

engagement) it could be suggested that WildKey has the potential not only to help address the decline in the numbers of young people involved in biological identification and recording but actually provides us with a means to involve more children than ever in this pursuit. The major boundary to such an ambitious suggestion is, of course, access to the hardware, but with the developments in mobile phone technology, in the near future, WildKey could operate on the mobile phone of any child.

CHILDREN FIND RARE BUG ON DAY OUT AT MUSEUM IT'S BEETLEMANIA

By Anna Dowdeswell

SCHOOLCHILDREN surprised scientists when they stumbled across a rare species of ladybird.

And their find was all down to the use of a device pioneered by enterprising inventors at Oxford Brookes University.

A group of 12- and 13-year-old pupils from The Cherwell School, in Marston Ferry Road, Oxford, found a *vedalia* ladybird on a day out at London's Natural History Museum.

The children were taking part in a project run by the university and were searching for insects in the museum's garden in Kensington when they found the ladybird, which is common in Australia and America, but had not been seen in the UK since 2002.

Lynn Hughes, of Oxford Brookes, who has been leading workshops at schools around the county, said: "It was exciting, with the kids finding a rare ladybird right under the scientists' noses." The children were issued with handheld computers,



CHECK IT OUT: Cherwell School pupils Thomas Matthews Boehmer and Sam Wood, on the lookout for ladybirds with a pocket computer ready to check what they find

Pictures: Ed Nik Order No. 121006116 oxfordmail.net/photosales

third time it's been found here. The first time was in 2003 when a man in a pub in Chelsea found it — it flew into his beer and he brought it in to us."

"Children are actually quite good at finding insects," he added. "They are closer to the ground and have sharper eyes. They found something 300 scientists at the museum missed."

nq@oxo.com

A BUG'S LIFE



● THERE are more 5,000 species of ladybird, with about 500 most common in Australia, where the *vedalia* originates

● The *vedalia*, or *Rodolia cardinalis*, was introduced to the US state of California in the late 19th century to control an insect called cottony cushion scale, which was infesting citrus orchards

● Ladybirds were the first insect used to control pests on crops

● Not all ladybirds have spots.

Appendix 2: Participating groups and the key(s) used during the workshop (and numbers of participants)

Aston Rowant Primary – playing field plants (14)
Barley Hill Primary – playing field plants (68)
Bladon Primary – pond animals (20)
Brightwell Primary - trees (15)
Caldecott Primary – playing field plants (40)
Chadlington Primary - trees (21)
Charlton Primary - trees (61)
Cherwell Secondary School – ladybirds / woodlice (59)
Didcot Girls Secondary – **butterflies (no records due to weather) (14)**
East Oxford Primary – minibeasts (12)
Ellen Wilkinson School for Girls – ladybirds / woodlice (21)
English Nature Aston Hill – trees, butterflies and ladybirds (10)
Five Acres Primary School – minibeasts / woodlice (25)
Harwell Primary – ladybirds / woodlice (46)
‘Holiday Recorders’ – trees, butterflies and ladybirds (11)
John Hampden Primary - butterflies (46)
Kingham Hill School – trees (21)
Lord Williams's Secondary – butterflies (32)
Long Crendon Primary – trees (59)
Marlborough Secondary – pond animals (36)
Middle Barton Primary – playing field plants (47)
Newstead Wood School for Girls – ladybirds / woodlice (26)
Northbourne Primary - butterflies (59)
Sibford School – playing field plants (27)
Standlake CubScouts - trees and woodlice (41)
St. Amands Primary - minibeasts / woodlice (18)
St. John the Evangelist Primary – pond animals (24)
St. Thomas More Primary - minibeasts / woodlice (34)
Tetsworth Primary – playing field plants (28)
Wootton (Abingdon) Primary – pond animals (14)

Key type:	Number of workshops in which key was used:
Butterflies	9
Trees	8
Pond animals	5
Playing field plants	8
Woodlice / ladybirds	14
Minibeasts	4

Appendix 3: Field Sites

Amersham Field Studies Centre, Buckinghamshire (Field Studies Council);

Bernwood Forest, Oxfordshire (Forestry Commission);

Diggers Wood, Oxfordshire and North Grove Wood, Oxfordshire (Woodland Trust);

Foxcombe Wood, Oxfordshire (privately owned);

Hill End Residential Centre, Oxfordshire (Oxfordshire County Council);


Little Wittenham Nature Reserve (Northmoor Trust);

Natural History Museum wildlife garden, London;

North Leigh Common, Oxfordshire;

Wytham Woods, Oxfordshire (Oxford University).

Appendix 4: Invitation to project 'wrap-up' workshop





Dear _____

**You are invited to the
Engendering a New Generation of Biological
Recorders project 'wrap-up' workshop**

Free WildKey software! **Training in woodlice
identification and WildKey –
skills and software you can use
anytime in the classroom even
without PDAs!** **Buffet and awards**

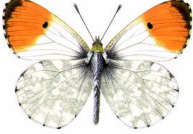




Date: Thursday 7th December
Place: Oxford Brookes University Headington Campus (see map)
Time: 4.30 pm – 6.30 pm
RSVP: Please contact Lynn on lhughes@brookes.ac.uk or 01856 483603

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Appendix 5: Example questionnaire for participating children

Butterfly workshop - evaluation sheet

Name: _____

	Before workshop	After workshop
	-----	-----
	-----	-----
	-----	-----
	-----	-----
	-----	-----

- **Before the workshop** - which of these do you do? Tick the boxes

Go out bird- or animal-watching <input type="checkbox"/>	Belong to a school wildlife group <input type="checkbox"/>
Belong to a wildlife organisation <input type="checkbox"/>	Enjoy identifying butterflies! <input type="checkbox"/>
Take part in BBC's Springwatch <input type="checkbox"/>	Record wildlife sightings on the Nature Detectives web site <input type="checkbox"/>

- **After the workshop**

	Yes	Maybe/ Sort of	No
Did you enjoy using the hand-held computers to identify butterflies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If not, why not? _____			
Did you find the butterfly identification program easy to use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you more likely to have a go at naming or recording wildlife in the future?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any more comments for Lynn? _____

Appendix 6: Written responses from participating children

N.B. the questionnaire was altered mid-way to allow children to write comments, therefore not all schools involved in the project are listed below

Key: **Equivocal** **Negative**

Aston Rowant / Tetsworth

It was wicked
I very enjoyed it. I would like to come again. Thank you.
I really enjoyed it so much
It was great fun.
It was really good for learning and really fun. I enjoyed it. Thank you for it.
I enjoyed it and found lots more things after.
I really want to do it more often. It was really fun.
It was great fun.
Fun.
I really think that using the program made it really fun.
It was really fun I want to use it again.
It was really fun and thank you for your help.
It is so fun.
I really enjoyed it though I hated the power station a lot!!!
I think I will go out more to identify wildlife.
I really enjoyed it and it was really good.
I really liked using the computers.

Brightwell

Thank you
Thanks for the day out – I really enjoyed it
Thank you for showing us the wood Lynn
Thanks Lynn for helping us

Barley Hill

Good lesson.
I enjoyed it.
It was fun.
It would have been better if it was sunny.
I really liked the handheld computers.
Thank you so much for letting us use the handheld computers. They're cool!
I really enjoyed today thanks.
Do the computers do just plants?
Where do you get the computers from?
Thank you very much.
I think you should use a different spot, because the sound of the electricity can be distracting.
I knew stuff about the PC 'cos I have got five.
Thank you Lynn.
Thank you Lynn.
It is great.
It would be better in the sun!!!
It was good but very wet.
It was good but disappointed it rained.

Caldecott School

It was really fun.

I did not like it that much. We could find more interesting things in our own time.

I have really enjoyed working with you.

I did not like missing play time.

Thank you and good luck.

Thank you.

I really enjoyed using the mini computers.

Charlton School

It was a really great workshop and I learnt so much!

It was a really good and fun activity.

It was fun and thanks for coming!

Thanks for today it was really fun.

Thank you! I really enjoyed it! I learnt so much!

I really liked doing it – it was fun to do.

Thank you for doing the workshop with us.

It was very fun. I would luv to do it again.

I did like the workshop because we got to use the computers

I enjoyed using the computers for researching.

The computers came in handy.

Using the PDAs is loads of fun.

I love the mini computers!!!

Do you just do plants?

It was a really fun day.

It was fun! I would like to do it again. Thank you!

It was very fun and you made it good. I found it was going to be boring but it wasn't.

There wasn't a huge challenge, but enough to make it fun.

Very good and fun with the little computers

I am very glad that you came

It was fun using the handhelds

It was fun

Good fun – like to do it again

I liked using the computers but it was sometimes hard to answer the question it gave to you.

It made it more fun having computers

I found out a lot more about trees so thank you.

It was really fun and enjoyable so thank you.

Thank you for coming and showing us different trees. It was really fun!

I thought it was really fun and now I know more trees than I did before.

I LOVED IT!!! Thanks so much...for the handheld computers.

I like the way that we got to use the handheld computers – that's what makes it fun!

I am very glad that Lynn came and I am now more likely to enjoy identifying trees in the future.

Thank you for coming in!

Let us play around first with computers

It was very fun

Cherwell School

This was great fun

Which is more common – the red ladybird or orange?

Thank you!!! It was fun.

It's fun!

It was good fun

I think there should be more species to collect. Thank you!

Thank you, I had a great time.

This was great!!!!

This was brilliant!!!

Really well done, well explained.

It's really hard to find any woodlice or ladybirds

Nice, fun, rejuvenating and I liked seeing nice bugs.

It was really fun and I thoroughly enjoyed it!
It was really good.
It was really good and fun
I had a great day!!!
It is hard to catch ladybirds holding the computers. Loved the workshop!!!
Really great – loved it – Thanks you!
Thank you very much it was a very good experience!
Thanks! Thanks for a great workshop
Perhaps a little more reliable outcomes, Great workshop!
Excellent workshop, perhaps a little more accuracy with identification.
I had a fun day. Thanks!
Thank you, I had a fun morning and would like to come again.
It was quite fun.
Thank you for the experience!
They are brilliant – I want one!
Brilliant.
It was a fantastic morning and I have learnt a lot.

Five Acres

I wish I could be someone like you.
THANK YOU!!!
very enjoyable experience
I had an enjoyable time with my friends
people were fighting over the computer. Thank you very much. I had a good time and am thinking of making a woodlouse farm
Not enough computers I did not get a go
Thank you for teaching us. I will remember everything about woodlice.
It was the greatest science session ever!
Are there any more species of woodlice?

Kingham Hill

A really good time out there with you and the PCs are really good with WildKey.
A really enjoyable experience. The handhelds were easy to use and were great fun. I really enjoyed it.
It has been fun and good because we did it with a computer.
Thank you for coming. It was good to do something new.
You are a good teacher Lynn.
Thank you, can I keep the PDA please?
It was good, thanks for taking us!
Thanks for taking us it was interesting.
Your lesson was very fun.
Thanks I had fun.

Middle Barton

It was fun to use but it didn't tell you what to do / click on
It's fun and quite easy to use the program
I learnt a lot from a handheld computer and I really enjoyed it
I really enjoyed the workshops especially the handheld computers
I thought it was very educational
I love doing it
It was good I would like to have one myself
Do you identify other things?
I really enjoyed it
I really enjoyed it
Thanks I had a really great time and I will have another go in the future!
If I was allowed to do it again I would.
At the beginning it was hard but easier at the end

Newstead Wood School for Girls

Where were all the ladybirds?!!

Thank you for taking our group today.
It was different and better than sitting in a classroom and the computers were cool!!!
It was great and the computers are great to use and very simple.
Thank you for a really good time – it was fun.
The computers made it a lot easier and funner.
I couldn't really find much as it was wet.
It was an interesting experience.
We should also have keys for other animals such as frogs. Thank you for helping us!!!

Northbourne Primary

The computers are wicked. Thank you for a good time.
Thank you for a good time
This was cool.
I had a great time – it was fun!
I enjoyed using a PC computer
It was really good and I hope to come back in the future.

I hate insects

It was so fun being with you. Thanks.

I hate butterflies

I hate bugs in particular crane flies

I had a great time and would love to come again
It was fun!
I liked it a lot especially the computers
It was excellent and you done well showing us around.
Thank you for teaching us. It's never easy to catch butterflies like I didn't.
Thank you Lynn I had a great time.
Great!
It was really fun!
It was a shame they cut the purple plants down
Thank you for helping me on butterflies

St Amands

That I really enjoyed her coming in and that I think everyone's had a really nice time
Are you coming back again?
It was fantastic! Come back in. thank you very much.
I enjoyed it and I might get some woodlice
Thanks for a good time Lynn
I want you to come back
Would you be coming back?
I think it's a great experience
Can you come in again?

Standlake Cubs

I like the look of the woodlice and they are really cool!
This is a really fun activity!
Well done! You are a fantastic wildlife explorer. I think this is going to encourage other groups.
It was fun using the computers.

St Thomas More

I'm scared of minibeasts and woodlice

will you ever come back to visit
It was very fun

how do you get any insects and equipment
no because it was perfect
No but I've enjoyed it!
Thank you for coming to our school
I really enjoyed it
will you ever come back?

Appendix 7: Questionnaire for teachers

Wildlife identification using hand-held computers

Teacher's name: _____ School: _____

Please tick the relevant boxes and let us know what you thought of the workshop – thanks

1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree

1 2 3 4 5

1. This was a worthwhile learning experience for your students

2. The hand-held computers assisted learning

3. The hand-held computers motivated the students

4. The students found the digital keys easier to use than they (might) find traditional field guides.

5. As a teacher, you would feel more confident about identifying species in the field if you had access to user-friendly digital keys

6. You would be more inclined to do biological fieldwork with your students if identifying species was made easier

7. In your experience, what are the obstacles to doing fieldwork with your students? (please tick those that apply)

Costs Getting cover Lack of confidence in fieldwork/i.d. skills

Curriculum pressure Behaviour management Reduced fieldwork in curriculum

Health and Safety Timetable problems

8. Will you, if possible, build on this experience back in the classroom? Yes No

9. Would you like to be informed of teacher training workshops which were designed specifically to improve wildlife identification skills? Yes No

COMMENTS (e.g. organisation of workshop(s), usefulness, interest of students, further information wanted)

Appendix 8: Written responses from participating teachers

Aston Rowant, Thelma Jones 'Good morning. Definitely engaged boys and gave them the confidence to identify unknown plants and look for differences and details'.

Barley Hill School, Helen Jackson 'Thank you – very enjoyable - shame about the weather!'

Barley Hill School, Mr Wyatt 'Thank you!!'

Bladon CP, Emily Arthur 'Very good. Well organised, fun and a great learning experience'.

Bladon CP, Carolyn Thorne 'Excellent – the children had a really good time and were motivated and learnt. Lynn- clear and firm! Good organisation. Brilliant day! N.B. Health and Safety – perhaps tell children to watch the end of the pond dipping nets! Every student feels they have learnt something and so do the teachers – so well worthwhile!'

Brightwell Primary, Roger Grant 'This was a fantastic teaching and learning experience. It shows how fieldwork can help relate their work to events in the real world and across other subjects. Thank you.'

Caldecott School, Linda Denoon 'Extremely valuable. Motivated a fairly difficult group!'

Caldecott School, Margaret Herbertson 'Very well organised. Lynn was able to engage the children well. The children were very enthusiastic – loved the handheld computers – they made the children much more proactive and on task than using a key!'

Chadlington Primary, Jo Crudge 'Really useful – the handheld PCs were a real novelty and the children used them confidently'.

Charlton Primary, Sally Way 'Organisation was great! The pupils enjoyed themselves and learnt a lot. A great approach and something I will add to my future plans. Thank you very much for providing such a great resource'.

Charlton Primary, Helen Foster 'Excellent pace and enthusiasm mean that the children were really on task despite the end of term and very hot temperatures'

Cherwell School, Maria Selby 'Excellent, enjoyed by all students and something completely different that they wouldn't otherwise get to do. Thanks!'

Didcot Girls' School, Rachel Huggett 'Excellent opportunity for students – even in the rain...really accessible program for Y7 students – all ages would enjoy'.

Didcot Girls' School, Lynn Nickerson 'The workshop was excellent – the 2 staff were very friendly, organised and established a good rapport with the girls. It really made the topic of classification come to life – students comment (in the rain and wind) "this is fun"! Students enjoyed themselves'.

East Oxford Primary, Helen Osbourne 'For some of our children reading was a problem but OK if paired with a reader. Very motivating for children and they quickly learned how to use the PDA. Many thanks.'

Ellen Wilkinson School for Girls, Miss Barnas 'We would be interested in developing links with your organisation as we have maths and science status. Also all the girls on the trip today are very involved in the wildlife project / garden at school. We have developed some areas around the school that have been neglected'.

Field Studies Council, Liz Farman 'All the children I spoke to were enjoying it and were engaged in the activity. They liked knowing what they had identified. A visiting A' level student thought they were great and would like to have used one'

Field Studies Council, Jackie Rham 'Students said they felt 'clever' because the key enabled them to identify plants more easily. In my opinion they concentrated far longer and were more motivated than with ordinary keys – particularly considering the weather'

Five Acres Primary, Erika Beale 'This was a fantastic experience, the students were very enthusiastic. Lynn was great. We will be buying some PDAs or EDAs for school'

Harwell Primary, Jenny Whit 'Very well run course, friendly staff'

Harwell Primary, Karen Muir 'A very worthwhile exercise, the children were motivated by the handheld computers and enjoyed learning through a different method'

Harwell Primary, Nicola Morrow 'The children were highly motivated throughout the session, which greatly enhanced our topic of habitats and reinforced class work. I would appreciate more information on future field studies. Thank you!'

John Hampden Primary, P. Greenwood 'Class loved the experience'.

John Hampden Primary, Miss Eele 'The children really enjoyed the experience. The organisation of the workshop was excellent and Lynn was brilliant. Thank you for a great day out!'

Kingham Hill, G. M. Lane 'Leader had excellent communication skills. Perhaps this could be the basis for an activity on a more regular basis?'

Long Crendon Primary, Angela Barnes 'Well organised, good control of children, exciting for everyone'.

Long Crendon Primary, Julie Goldsmith 'Very good. The children enjoyed it'.

Long Crendon Primary, Diana Taylor 'Very good'.

Lord Williams's School, Claire Greenhalgh 'The pupils really enjoyed doing some 'real life' science outside the classroom and said the time went quickly. They were enthusiastic about the training and various activities'.

Marlborough School, Emily Adams 'Lyn was excellent with the students and they really enjoyed the experience.'

Marlborough School, Michael Noone 'Brilliantly done – you had thought of everything. A very worthwhile activity – will be interested to hear if/when it is made more widely available'

Middle Barton, Alison Humphries 'The less motivated children were definitely more on-task using the handheld computers'.

Middle Barton, Helen Holland 'It fitted in beautifully with previous work. It helped me in my learning and the children to move on quickly. However, they did want to explore everything the computer could do'

Newstead Wood School for Girls, Gordon Wright 'A wonderful experience. If we had the money we would purchase hand-held computers and perform similar species identification around our school and area. Students enjoyed the day'

Newstead Wood School for Girls, Teresa Cheyne 'Would worry if the technology failed and wouldn't know how to rectify it'.

Northbourne Primary, Rob Woods 'It was a great day and the children really enjoyed it. It fits in perfectly with our work in science and ICT. Thank you'

Northbourne, Lyn Hill 'Excellent. I really hope it runs again next year, the funding made it so much easier. The instructor was excellent'.

First Standlake Cub Pack, Anne Kearns 'Organisation was superb, we were just a little short of time. The children were totally engaged from outset of the trip. There was certainly a gain of knowledge and interest from the parent-helpers and the children. People were enquiring about purchasing the software'

Sibford School, Lesley Nell 'Well organised. Would like to be kept informed of the availability of other programmes. Many thanks.'

Sibford School, Patsy Howes 'The database needs extending for plants and trees, some suggestions included. I am confident in keys and wildlife recognition'

St Amands, John Laverty 'The workshops went extremely well, the children were instantly engaged, enthused by the PDAs and well taught. There were no behaviour problems despite 2 children having regular behaviour issues. An immensely useful activity'.

St John the Evangelist, Anna Foreman 'Very useful and supported our curriculum studies well – habitats / environment. Children very excited about using the computers and pond dipping! Thank you very much'

St Thomas More Primary, Alastair Ewans 'Almost all children were very highly motivated by the workshop and enjoyed the experience very much. Some of the children didn't quite understand what the purpose of the GPS system was'

Tetsworth School, Alison Turton 'Good, great fun, always up for a cheap morning out!!'

Wootton St Peter's, Shona Howie 'The children had a great time despite the heat. Thank you'

Appendix 9: North Leigh Common – species children were tested on

Butterflies

1. Gatekeeper
2. Orange tip (male)
3. Brimstone (male)
4. Comma
5. Speckled wood
6. Large white
7. Peacock
8. Painted lady
9. Red admiral
10. Common blue (male)
11. Meadow brown
12. Green hairstreak

Trees

1. Elder
2. Hawthorn
3. Holly
4. Common ash
5. Field maple
6. Pedunculate oak
7. Sycamore
8. Silver birch
9. Grey willow
10. Blackthorn
11. Goat willow
12. Crab apple

Ladybirds

1. 14-spot
2. 24-spot
3. 22-spot
4. Orange
5. 2-spot (melanic)
6. Cream spot
7. 2-spot
8. Harlequin (succinia)
9. 7-spot
10. 10-spot

Appendix 10: March and April 2007 – species children were tested on

Minibeasts

1. caterpillar
2. woodlouse
3. centipede
4. bug
5. millipede
6. moth
7. beetle
8. earwig

Woodlice

1. Pygmy woodlouse
2. Common pill woodlouse
3. Common rough woodlouse
4. Common smooth woodlouse
5. Common striped woodlouse