

UK- Environmental Observation Framework

**Citizen Science Observations and Monitoring:
Scoping Requirements, Knowledge exchange
and finding potential synergies**

27th July 2011

Workshop Report

Executive Summary

The UK-EOF Citizen Science workshop, held on 27th July 2011, was well attended and participants provided extremely positive input. The main aims of the workshop were to scope out the requirements, aspirations and plans of public organisations for citizen science monitoring. It was also used as an opportunity to share best practice, discuss issues and concerns, as well as identifying areas for collaboration and determining whether there is a need for future coordination.

There was enthusiasm and a clear appetite for discussing the potential of citizen science. The round table presentations provided a useful summary of what is currently being addressed across the public and volunteer groups. Discussion sessions on the challenges and potential areas for collaboration also provided the initial steps to inform and join up the community.

From the workshop it was apparent that

- No one person or organisation has a clear picture of what is happening. The activities stretch across observation and research and cover a wide range of societal issues from weather, earthquakes and water pollution to biodiversity.
- The drivers behind the activities vary significantly between scientific studies, education or getting the public more engaged and raising awareness of the natural environment. The overall driver can not only determine the type, quality and quantity of data required but also the level of volunteer expertise needed.
- An assortment of language and terminologies are currently used. Clarity is therefore needed to ensure we have understanding across the community.
- Citizen Science may provide organisations with the opportunity to do things or organise themselves differently.
- There is capacity within the volunteer networks for collaboration but the needs must be clearly defined and articulated. The practicalities of modifying monitoring or research activities must be thought through as this may take several years to implement.

Several actions and recommendations were agreed during the day, some of which will be taken forward in the immediate future and others which will require thought and planning before they can be progressed.

In the short term, following the workshop the UK-EOF will:

- Amend records in the UK-EOF catalogue to show where there is volunteer input and liaise with voluntary organisations to add activities that have been missed to date.
- Facilitate actions to:
 - Coordinate an in-depth discussion with the marine volunteer community.
 - Approach the Freshwater Biological Association (FBA) to discuss whether they would be receptive to a knowledge exchange meeting with the Marine Biological Association (MBA).
 - Liaise with the Non Native Species Secretariat (FERA) to discuss citizen science and the EEA 'Alien Species' project.
 - Facilitate a meeting between BGS and BTO and BGS and JNCC (butterfly monitoring) regarding the possibility of using volunteers to collect drought data.

In the longer term the UK-EOF will work with the public sector and volunteer communities to consider how best to take forward recommendations to:

- Better understand the motivations of environmental volunteers (who range from the general public to expert) – this will help us to improve retention and engagement with volunteers.
- Assess how citizen science could be used to better effect, for example, identify the potential for citizen science to fill known data gaps, including the UK contribution to and benefit from EU and international monitoring.
- Investigate whether current recording schemes could expand their surveys to include other taxa and environmental variables needed by others.
- Understand where and how technology can transform the quality and quantity of data from non experts e.g. software, statistics etc. and how we can make best use of technology, for example, using a smart phone app to identify and/or record species.
- Investigate the potential to set up linkages between schemes to encourage volunteers to get involved.
- Ensure that volunteer collected information is accessible so that volunteers can see where their records fit in with other information.
- Investigate the potential to link certain species (or groups of species) to habitat types and produce a 'proxy' for a habitat which non-experts could record. In addition engage with AHRC to consider how 'a sense of place' may be related to habitat type.

To take the longer term recommendations forward several different approaches will be needed and could include workshops or smaller focus groups. The UK-EOF will continue to help drive future discussions and collaboration and will facilitate the necessary meetings to ensure that best practice and the needs of the community are shared.

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Introduction

Why a Citizen Science workshop?

Over the past year the Westminster Government's drive for the Big Society and the Localism agenda has encouraged organisations to engage better with society with respect to the environment. By encouraging society to become involved in conserving or monitoring their own environment, awareness and interest will increase. In turn this will help people to understand and value the environment, thus enabling society to take more responsibility for their natural surroundings. This concept is being incorporated into strategies and initiatives, for example in the recent Natural Environment White Paper for England the government set out clear aims to "facilitate greater local action to protect and improve nature". The National Ecosystem Assessment, released in June 2011 highlights the need for the involvement of society in managing the natural environment. In Scotland, the Coordinated Agenda for Marine Environment and Rural Affairs Science (CAMERAS) is considering the role for citizen science in their work. In Wales the Natural Environment Framework includes reconnecting people with their natural surroundings and increasing the value they place upon it and Northern Ireland, in the process of developing a Environment Strategy, have recognised that to address the breadth of environmental issues, a cross cutting approach is needed and a range of stakeholders required. This includes, amongst others, the community, the voluntary sector and the general public.

From figures gathered in 2008/09, the UK-EOF estimated that the voluntary environmental monitoring effort was worth approximately £43 Million. In 2011 The Natural Environment White Paper quoted the value to be £50 Million. Within the UK-EOF Observation Activity Catalogue, of the 1150 activities and programmes, 134 are tagged as voluntary. The majority of these are related to biodiversity schemes. It is known that more activities exist and although this number is thought to be an underestimate it is clear that the voluntary sector already makes a significant contribution to environmental monitoring in the UK.

UK-EOF agreed to hold an initial scoping workshop, with the aims of:

- a) Identifying the requirements, aspirations and plans of public organisations for citizen science monitoring.
- b) Exchanging knowledge on best practice and discuss issues and/or concerns.
- c) Identifying areas of synergy across both organisations and sectors.
- d) Scoping out the need for further co-ordination (by the UK-EOF or others) to achieve any potential synergies identified and consider whether further national work is needed as recommended in documents such as Measuring Change in the Countryside and Beyond 2010 reports.

An attendee list and agenda are at Annex A and B respectively. It was envisaged that further work involving the wider voluntary community would follow this workshop.

Definition of Citizen Science

There has been much confusion over the term 'Citizen Science' therefore for the purpose of this workshop Citizen Science was defined as "*Non salaried involvement in collecting environmental observations / measurements which contribute to expanding our knowledge of the natural environment*". This broad definition covers all levels of volunteer engagement from expert, skilled volunteers to non-expert recorders as well as the various types of surveys, including organised structured surveys, those carried out by interest groups and those designed for public engagement purposes. For the UK-EOF the observations in question are long-term repeated observations or time series, although it was acknowledged that collection of environmental information by volunteers may not be for this reason alone.

Session 1: Round Table: Current volunteer contributions, future aspirations, opportunities for collaboration and concerns.

Following an introduction to the day, participants were invited to spend five minutes describing their organisation's current involvement with volunteer schemes or programmes, their future aspirations for engaging with volunteers and also any opportunities for collaboration with others or concerns they had over Citizen Science.

This session was extremely positive with much to be learned by all. A summary of the discussion and the general concepts that emerged are provided below, details of each organisation's involvement and aspirations can be found in their statements in Annex C.

Several organisations such as the BTO and RSPB have much experience of working with volunteers and have built up their volunteer base over many years. They are reliant on their volunteer networks that not only collect information but also organise other volunteers. The majority of other organisations around the table, have had some involvement with volunteer schemes either directly, indirectly (by using volunteer information) or via collaborative opportunities. It was generally felt that volunteers could be used to a greater degree and several organisations were keen to learn how this could be done effectively.

Drivers

There are a range of drivers and aspirations for engaging with or increasing numbers of volunteers and organisations are at different stages in the engagement process. Drivers include encouraging the public to become involved, raising environmental awareness and education, gathering information to address policy or science questions or as a cost effective way of collecting information.

Fitness for Purpose

The importance of engaging the public in science issues was expressed as an effective way to communicate and ensure that environmental issues are understood. One-off public surveys introduce people to environmental monitoring and are often the stepping stone to building long term future volunteer capacity. Mark Eaton from the RSPB explained that there are different levels of engagement which require different levels of volunteer ability; he used the idea of a pyramid as shown in Figure 1 to explain this.

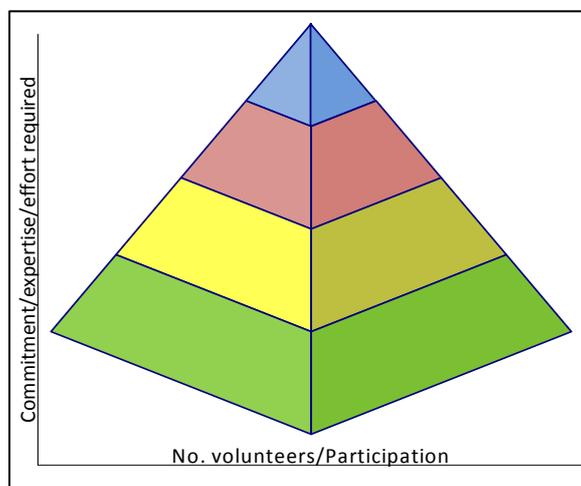


Figure 1: The Volunteer Pyramid
Some volunteers or amateurs are international experts who are highly skilled - these experts form the top tier of the pyramid. As you move down the pyramid the commitment, effort and expertise decreases but the number of volunteers increases. All levels provide valuable input however it is important to understand the differences across the volunteer base, such as data quality verses coverage.

There was some debate over the value of casual records (completed and submitted independently by volunteers), compared to science-led structured surveys (in which participants are provided more guidance). The use of casual records may be more limited and open to misinterpretation however they do provide useful information. Some felt that structured surveys were a more efficient way to generate useful scientific information. The method chosen depends on the driver for the programme and end use of the information, for example, science or education, increasing the spatial and temporal coverage, providing additional supporting or supplementary information.

Sustainable Networks

All were in agreement that volunteer networks are not free; resources are required to support/manage volunteers and the associated infrastructure (training materials, data collation, processing etc). Costs can be minimised by the use of internet-based access to materials and online recording tools. Volunteer expectations must be managed and feedback provided. The need for knowledge exchange is essential. Volunteers want to know how their information is being used, therefore tangible outputs are required. Social networking tools are being used to communicate with volunteers; these help to maintain engagement and advertise when a monitoring campaign is being launched or underway.

Participants were keen to identify opportunities both at the national and local level. Immediate collaborative opportunities exist where current programmes, such as Bird Track, could be expanded to record other taxa [however it may take some time before new variables can be included within a recording scheme]. It was suggested that as more organisations look to become involved in citizen science we may need to work better together to share volunteer pools. A common aspiration was the use and development of new technology such as smart phones to record the natural environment.

Concerns mainly centred around data quality and verification, especially when considering statutory monitoring which requires both scientific rigour and the use of standardised methods. The concerns and challenges were discussed in more detail in Session 2.

Session 2: Considerations and Challenges

Prior to the workshop the UK-EOF asked participants to submit the challenges that Citizen Science may pose. Responses were collated and grouped into 5 areas:

- Recruiting, retaining and managing volunteers
- Supporting volunteers
- Practicalities of Cross Partner working
- Quality Control / Assurance
- Other

Participants were encouraged to discuss their experience or any known solutions to these challenges. The session invoked a lively discussion, from which it was clear that there are many linkages between the different challenges listed above. Information and any actions arising from the discussions were captured on posters, a transcription of which can be found at Annex D.

Engaging Volunteers

Before engaging volunteers, clarity is needed with regards to the area/s that volunteers can help to gather information. All were reminded that volunteers have different levels of knowledge and expertise therefore the volunteers that you need, will depend upon the information required; this too will impact on the quality of the data received.

The requirements must be clearly communicated to volunteers along with any guidance or standards that must be adhered to. Best practice around data quality and assurance could be learned from other organisations, for example, SNH advocate standard methods for species recording and the NBN have developed Record Cleaner, an automated tool for the validation and verification of biodiversity data which uses taxonomic 'rule sets' defined by national recording schemes and societies. NBN Record Cleaner can be downloaded at <http://www.nbn.org.uk/Record-Cleaner.aspx>, along with a users' guide and verification rule sets for birds, butterflies, macro moths, hoverflies, higher plants and marine taxa. The production of metadata to accompany datasets can help to increase the validity, promote fitness for purpose and the re-use of information.

To ensure that the volunteer base is maintained, engagement should begin at an early age, encouraging interest in the natural environment and participation in organised surveys at school. Engagement should be a 'journey' which allows first time volunteers to find and refer to other information which will help maintain their interest. Opportunities to become involved need to be well advertised and diverse allowing different levels of volunteer to join in and preferably progress their skills – volunteering activities could be included in university courses or apprenticeship schemes, as currently happens in Scotland. Tourism 'activity' holidays could be conducted in locations that lack regular volunteers. Whichever mechanism organisations use, they must consider the needs and interests of the volunteer as well as ensuring there is good knowledge exchange and feedback. The BTO have done some initial work on why people volunteer, however there was agreement that the motivations and interests of environmental / natural science volunteers needs to be better understood.

Common perceptions and misperceptions

Volunteer programmes do not result in the collection of 'free data', as support, training and materials may be necessary along with mechanisms to collect, analyse and use the data.

There was concern that Citizen Science may be seen as using volunteers to replace staff, however the view of most participants was that Citizen Science could provide the opportunities to do things differently. The provision of additional data may enable public organisations to prioritise staff and enable them to be deployed elsewhere thus increasing efficiency both for data collection and within the organisation.

Technology

The use of new technology came up repeatedly. Online guides or species recognition technology streamed to smart phones could make recording more accessible to a wider group of volunteers. Such technology would also help to increase the reliability of data and ensure continuity (especially if considering volunteer turnover - by using the same recording system/application, the data collected should be consistent). New online recording tools will enable volunteers to submit their own data and technology could also be used to provide better analysis of data.

Specific actions which arose from this session:

Practicalities

- Include the Field Studies Council in any work done on engaging volunteers
- SNH to circulate the CAMERAS Monitoring Focus paper when published. This looks at monitoring requirements across 15 different environmental areas.

Data Issues

- SNH to send links/ details of their standard methods for species recording to the UK-EOF.
- NBN to send links to Record Cleaner and information about how these were developed to the UK-EOF.
- NBN to send links to details of the IPR study to the UK-EOF.

Recruiting, retaining & managing volunteers

- SNH to provide links to information about BTCV apprenticeships to the UK-EOF.
- Forestry Commission to send link to 'EU-wide Monitoring methods and systems of surveillance for species and habitats of community interest' report to UK-EOF.
- UK-EOF to commission a project to understand the motivation of 'environmental / natural science volunteers.
- UK-EOF to create summary guidelines and report useful links to help organisations understand how to approach volunteer management (including motivations of volunteers, requirements for providing resources, feedback, level of management etc).
- SNH to provide links to known examples of tourism involvement in surveying, such as Earthwatch etc.

Supporting Volunteers

- UK-EOF to liaise with the Department for Education and raise the views of engagement with secondary school children.

Session 3: Opportunities for collaborative working and engaging volunteers

Participants were split into 3 groups and rotated around: Water (Freshwater and Marine), Air & Meteorology and Land (Urban and Rural). At each station the groups were asked, considering their aspirations for citizen science:

- Where there were opportunities for further interaction and collaboration with current volunteer networks
- Whether new volunteer engagement are needed.
- Who needs to be involved & on what timescales?
- Whether there are any practicalities or limitations that need to be considered.
- What role should the UK-EOF play in taking any suggestions forward?

Working in Collaboration

From the discussions held it is apparent that some voluntary activities are already working in collaboration with the public sector, for example the Royal Meteorological Society, the Met Office and the EA. However there are many other activities which could potentially expand to collect information on other taxa or variables, for example the BTO could ask their volunteers to collect information on drought cracks (for BGS), or standing waters. Any expansion of current programmes would require resources and clarity of the reasons for additional data collection, protocols, safety etc.

Links between volunteer programmes/schemes could be set up or strengthened to raise awareness and encourage volunteers to get involved in different activities, it was suggested that this could be hosted by the NBN.

In addition, there are many other potential sources of voluntary information, for example, recreational anglers already contribute to the Riverfly Recording Schemes and the Wild Trout Trust's Trout in the Town initiative, Offshore workers collect information on birds and other species via the North Sea Bird Club (<http://www.abdn.ac.uk/nbsc/>) and research has been conducted to measuring air quality using mobile devices attached to cyclists ('passive' volunteers). Many other groups could be approached; however limitations, such as inaccessible areas (deep sea) or commercial sensitivity of, for example, fishing data must be considered.

Continuous Monitoring

The need for continuous or ongoing monitoring was discussed. Although some monitoring is already automated (EA Hydrometry), automation is not always the best option financially. Therefore volunteers may be able to contribute to gathering additional information, be it supporting information or interim information between 'staff' visits, for example volunteers could report any cliff erosion activity to the BGS between site inspections. It was highlighted that for some activities data augmentation by volunteers may be limited especially where a high degree of precision is needed or samples require analysis.

Information Gaps

Specific information gaps that could be fulfilled by volunteers were raised under each topic station. Under Land (Rural and Urban), habitat and community change was raised as data that is often missing or lacking. Volunteers could be asked to validate Earth Observation data by submitting photographs as evidence (geography.org are attempting to photograph every 1km of habitat). Another way to increase habitat

information may be to assign proxies – by linking an easily identifiable species, which non experts could record, to habitat type so that habitat type can be inferred. Proxies are already used for air quality, for which OPAL and the Lichen Society measure lichens as indicators. Other proxies could also be used for other variables such as insects for air temperature and humidity.

Our understanding of cultural ecosystem services is not well understood therefore the importance of engaging with the Arts and Humanities Research Council community with regard to how 'our sense of place' relates to habitat was raised.

Invasive non-native species, (which has an international component), was raised many times as a potential area for volunteers to record information. Concerns over identification and motivation of volunteers if constant negative sightings were recorded would need to be addressed in any volunteer programme. FERA hosts the Non Native Species secretariat and is therefore ideally placed to collaborate with relevant organisations, for example with BSBI, EEA MCS, BTO, MBA, CEH etc.

BGS require more drought information and as previously mentioned the presence of drought cracks could be recorded by BTO, JNCC butterfly or other volunteers.

Increased monitoring of mundane species was also suggested. Few recording schemes currently monitor these and increased data could provide information on the different communities.

A current barrier to engaging with volunteers may be that the volunteer groups do not know what information data users require. Therefore improved communication channels to clarify what information is required (and why) may enable groups such as the Greenspace Information for Greater London to guide their volunteer effort. Clarification of need could also improve interdisciplinary use of information and collaboration, for example many biodiversity studies could benefit from networks of meteorological information as climate may explain changes in biodiversity.

As already mentioned, many voluntary activities are already underway and it would be beneficial if there was better coordination and understanding of what is happening. Workshops could be held to do this, however overall goals – to fill gaps and/or encourage the collection of more data must be carefully considered, along with the cost/benefit of using volunteers. The UK-EOF Environmental Observation Activity Catalogue could be used to help identify gaps.

Technology and Recording Tools

The use of technology to improve the quality and quantity of records was discussed. Image recognition, as used by the American programme i-trees, could help volunteers with difficult to identify species, online keys accessed from smart phones also provides reference information whilst in the field. The majority of modern phones have built in GPS and with the development of certain applications could be used as personal sensors for air, water etc with automated transmission of information. Examples of this kind of technology are already being used by Bat recorders, who plug their bat monitoring devices directly into their mobile phones and transmit information. Developing more integrated use of technology may lead to engagement with a wider group of volunteers who are interested in using 'gadgets'.

In addition online recording tools and editable maps such as Open Street Map, could provide opportunities for recording natural data. The Met Office and the Royal Meteorological Society have recently released the Weather Observation Website

(WOW) to which anyone can add weather information that is shown on a map (<http://wow.metoffice.gov.uk>).

Learning Lessons

From this session it was apparent that there are opportunities to share knowledge and learn lessons in best practice from each other, for example the marine community could share lessons with the freshwater community on how they use their data and how the MBA interact with voluntary recording activities. The EA also have a wealth of knowledge and guidance that is issued to their own staff – if necessary such information could be shared with volunteer groups. There are also opportunities to improve the way that volunteers can access the information that they have collected for example via the production of atlases or interactive records online.

Actions and Recommendations

The actions and recommendations generated in this session included:

- Investigating firstly what is needed and secondly whether existing recording schemes could expand their surveys to include other taxa and environmental variables at allocated sites. Specifically the collection of drought cracking information (for BGS) by BTO and JNCC butterfly volunteers.
- Improve communication between information users and volunteer groups who collect information.
- Identify how citizen science could be used to better effect in the Freshwater environment. UK-EOF to discuss with the EA whether there is a need for a Freshwater workshop.
- UK-EOF to approach the Freshwater Biological Association to ask whether they would be receptive to a knowledge exchange meeting with the MBA.
- MBA to draw up a proposal for a workshop, which the UK-EOF will facilitate to discuss citizen science in the marine environment.
- UK-EOF to discuss citizen science and invasive species with the NSSS. Any work could include collaboration with the EEA 'alien species' project.
- UK-EOF to engage with volunteer groups to ensure all voluntary observations are registered in the catalogue.
- Investigate the potential to link certain species (or guilds) to habitat types and produce a 'proxy' for a habitat which non-experts could record.
- Engage with AHRC to consider how 'a sense of place' may be related to habitat type.
- Consider the use of new and different technologies to aid identification and capture of records.
- Investigate the potential to set up linkages between schemes to encourage volunteers to get involved (NBN may be able to host).
- Ensure that information is available for volunteers to access and they can see where their records fit in with other records.

Recommendations and Next Steps

The workshop illustrated that there is both interest and enthusiasm for incorporating the capability of Citizen Science within monitoring. Many organisations are already involved in activities and many of the actions from the day involved learning lessons and exchanging knowledge, particularly with respect to engaging volunteers and data issues.

It was agreed that we need to further our understanding on the motivations of volunteers and a guidance document, which brings together known information on all aspects of working with volunteers, would be beneficial.

It was apparent that collaborative opportunities exist and specific suggestions for potential collaborations, mentioned during the workshop, will be followed up by organisations and the UK-EOF.

Further investigation into what is required and what could realistically be achieved by volunteers is needed. Better communication of these requirements between the users of data/information and volunteer groups, who could direct and guide volunteer recording, is also needed.

The UK-EOF will, over the coming months engage with volunteer groups to capture information on current activities so that it can be added to the UK-EOF Observation Activity Catalogue. The recommendations generated during this workshop will also be considered. Different approaches may be needed to take recommendations forward and could include workshops or smaller focused groups. The UK-EOF will continue to help drive discussions and collaboration as well as facilitating the necessary meetings to ensure that best practice and the needs of the community are shared.

Annex A - Attendees

UK- Environmental Observation Framework

**Citizen Science Observations and Monitoring: Scoping requirements,
knowledge exchange and finding potential synergies
Charles Darwin House, London, 27th July 2011, 10am – 3pm**

Name	Organisation
Andy Howard	BGS
Andy Musgrove	BTO
David Howard	CEH
David Roy	CEH [Biological Records Centre]
Peter Costigan	Defra
Rob Grew	EA
Ian Davidson	EEA
Kath Tubby	Forestry Commission
Matt Davies	Greenspace information for Greater London (GiGL) / Association of Local Environmental Record Centres (ALERC)
Deborah Procter	JNCC
Andrew Watkinson	LWEC
Lizzie Jones	LWEC (NERC)
Matt Frost	MECN (MBA)
Malcolm Kitchen	Met Office
Keith Porter	Natural England
Jim Munford	NBN
Paula Lightfoot	NBN
Michael Schultz	NERC
Nick Voulvoulis	Opal (Imperial College)
Mark Eaton	RSPB
Ian Bainbridge	SNH
Angela Ellis Paine	Third Sector Research Centre (Bham)
Beth Greenaway	UK-EOF
Andrea Sharpe	UK-EOF
Amber Vater	UK-EOF
Jo Amesbury	WG

Annex B – Workshop Agenda

UK- Environmental Observation Framework

Citizen Science Observations and Monitoring: Scoping requirements, knowledge exchange and finding potential synergies

**Charles Darwin House, London
27th July 2011, 10am – 3pm**

The workshop aims to:

- a) Identify the requirements, aspirations and plans for citizen science monitoring.
- b) Exchange knowledge on best practice and discuss issues and/or concerns.
- c) Identify areas of synergy across both organisations and sectors.
- d) Scope out the need for further co-ordination (by the UK-EOF or others) to achieve any potential synergies identified and consider whether further national work is needed as recommended in the Measuring Change in the Countryside and Beyond 2010 reports.

Agenda

Registration and Coffee from 9.30am

10.00 Introduction, Aims and Objectives of workshop

Presentation – *Beth Greenaway, UK-EOF.*

10.10 Working with volunteers – what do we do and what do we want?

Presentation: What do we mean by Citizen Science & what do we know regarding volunteering for environmental observations? *Andrea Sharpe, UK-EOF.*

Session 1: Round table – **5 mins per participant** to share views on how volunteers currently contribute, future aspirations and opportunities for using volunteers.

11.45 Break

12.00 Considerations and challenges

Session 2: Issues and Challenges – Discussion. Participants are asked to share their experiences of overcoming or working with such issues.

12.50 Lunch. The UK-EOF Catalogue will be available for viewing.

13.30 Identifying Common Requirements and collaborative opportunities:

Session 3: Group discussions to identify synergies and opportunities for engaging volunteers. This could include the possibility of extending current programmes to incorporate further measurements, the practicalities of these suggestions etc.

14.40 Coffee

Next steps and way forward

14.45 Next steps – areas to take forward collectively and the role of the UK-EOF.

15.00 Wrap up and close.

Annex C – Organisation Statements

All those invited to the workshop were asked to provide a short statement on:

- *How volunteers contribute to your current monitoring systems,*
- *Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make,*
- *Whether you believe there are collaborative opportunities and where?*
- *Any issues regarding citizen science for monitoring that you would like to discuss.*

Participants were asked to present these views during the round table in Session 1 of the workshop.

Statements were received from:

Department of Environment, Food and Rural Affairs	13
Scottish Government.....	13
Welsh Government	14
Environment Agency	15
Scottish Environment Protection Agency	16
Forestry Commission	18
Natural England	19
Joint Nature Conservation Committee	19
Countryside Council for Wales.....	20
Scottish Natural Heritage	21
Centre for Ecology and Hydrology	23
CEH Biological Records Centre	23
National Biodiversity Network	24
British Trust for Ornithology	26
Royal Society for the Protection of Birds.....	28
Open Air Laboratories (OPAL).....	29
British Geological Survey	30
Met Office.....	31
Royal Meteorology Society	31
Third Sector Research Centre, University of Birmingham	33
European Environment Agency	33
Marine Biological Association	34
Greenspace information for Greater London	36

Department of Environment, Food and Rural Affairs (Defra)

Defra funds a large amount of environmental monitoring and much of the associated infrastructure. We believe there are opportunities to improve how the information is collected to provide better spatial and temporal coverage as well as gathering information more cost effectively. We need to take a more integrated approach to monitoring.

Defra acknowledges the huge contribution that volunteers make to collecting data, and Defra provides some of the funding to collate this information into indicators which can influence policy. There could be more opportunities for volunteers to collect useful environmental data. This could help to fill in some of the temporal and spatial gaps in the datasets, and provide satisfaction to the volunteers. One of the themes of the recent Natural Environment White Paper was the need to reconnect

people and nature. One way to assist this will be a new web portal called 'My Environment'. This will help people to find out about the environment in their local community and learn how they can play their part in creating a better environment. 'My Environment' will also advise people on how to upload their own data to supplement that collected by government, meeting a request that came up frequently in responses to the consultation for the White Paper.

The Scottish Government

The Scottish Government is supportive of engaging the public in science. Beyond raising awareness with the general public of the relevance and benefits of science to society the concept of citizen science moves things to the next stage. The involvement of volunteers be they enthusiastic amateurs, current or retired professionals in monitoring activities is recognised as having the potential to deliver significant benefits. Indeed there are instances of specialist areas where retired experts have essentially maintained UK expertise during times when the 'pipeline' of new talent has been temporarily turned off as a consequence of changes in the priority areas for funding – I think lichen taxonomy would be an example.

There are though issues of using volunteers especially in the area of quality control and quality assurance. The extent to which these represent limitations is dependent on the questions that are being addressed, e.g. for broad indicators of change then quality issues are likely to be of less importance than looking for more subtle where questions of statistical power, representativeness of the sampling grid etc. will need to be considered.

Some areas are more amenable to citizen science than others, e.g. observations of the blooming of flowering plants across the UK should be simple and reliable. By contrast anything that requires specialised equipment immediately limits the opportunity and scope for largely terrestrial based volunteers and some areas will simply be out of reach of, e.g. offshore marine monitoring, upper air quality etc. Having said that of course technology moves on and who's to say that in a few years time there may be simple probes that can provide basic but reliable information on environmental parameters like water quality and which could be made widely available. And there might be down loadable 'apps' to show pictures, e.g. of fungi, that could enable narrowly based expertise to be broadened out. So it's horses for courses with land based biodiversity related work being the area with which most volunteers can readily associate and be enthused by – as evidenced by the popularity of 'Spring Watch' and the like.

Welsh Government

Currently the Welsh Government does not directly commission volunteers/organisations as part of its monitoring systems or schemes. However, in terms of wider evidence use, we do utilise some sets of monitoring data that have been collected either by volunteers or citizen groups as part of wider initiatives. Our interest in this workshop is to discuss three main issues

- 1) The relative strengths and weaknesses of this type of data in terms of scientific rigor and methodology
- 2) Whether citizen participation can contribute to wider capacity building for Wales in terms of a range of skills (scientific, monitoring, research etc)?

- 3) How collaborative opportunities could be incorporated into a wide ranging monitoring scheme at a local level?
-

Environment Agency

The Environment Agency already works with Third Sector organisations and directly with volunteers (see examples below). The experience of bodies such as the National Trust and British Waterways demonstrate the greater potential and benefits of co-ordinated opportunities.

Initial work has looked at opportunities to increase volunteering across our navigation, recreation, fisheries, flood risk and monitoring operations. Some potential has been identified in most of these areas although further work is required.

Concerns have been expressed about employee/union relations regarding the increased use of Third Sector organisations and volunteers. These are linked to the contraction of public spending which could create the impression that employees would be replaced by volunteers or volunteers are only being used to because paid staff are not available..

Other potential challenges that will need to be resolved and we may usefully explore include:

- identifying the best opportunities for volunteering across our business;
- ensuring that our procurement and partnership building processes are fit and effective for to working with charities and other not-for-profit groups;
- establishing consistent boundaries and guidance for staff who engage volunteers e.g. payments and tax liabilities;
- developing and providing appropriate training, insurance and health & safety protocols for specific volunteer programmes and the staff involved;
- establishing realistic mutual expectations with volunteers;
- ensuring that our operations, data quality and customer service are not compromised.

A stepped approach to change may be needed to make sure we are not putting our core services at risk. More radical changes can be considered once we have piloted and assessed the viability of extending our use of volunteers in our activities.

Environment Agency Engagement with the Third Sector

Contracting delivery

We already work with a wide range of third sector organisations to deliver environmental outcomes. These include:

- **Formal contracts** with RSPB for habitat creation (done through formal competitive tendering)
- **Informal partnership** arrangements with local voluntary groups (such as Wildlife Trusts and fisheries groups).

Examples of Volunteering Activity

- **FCRM** – FCRM currently engage with the third sector in two mains ways:

Flood Wardens – these are volunteers who are used to help disseminate flood warnings to local communities. They do not work for the Agency and we ensure that a community, parish council, local authority or other organisation that works with the community takes on the role of coordinating the scheme, rather than us owning it.

Floodwise – This is the campaign to raise awareness of the risks of flooding. It represents a change in the way we raise awareness as it is more locally focussed than previous national campaigns. Engagement with the third sector is crucial in delivering this. On a national scale we have been working with the Women’s Institute and the National Association of Local Councils and locally with Gingerbread and other similar organisations.

WRVS – We also work closely with the Women’s Royal Voluntary Service who assist with recovery after flood events.

- **Fisheries** - Volunteers have been engaged in fisheries work for some years, contributing to core work areas including:

Angling participation – Over 30,000 people are introduced to responsible angling each year, largely through trained volunteer coaching events in partnership with bodies such as the Angling Trust, Angling Development Board, Welsh Federation of Anglers, Scout Association, as well as more local groups.. Of these people, 10,000 do so during the National Fishing week.

Social inclusion – Work with bodies such as Dreamstore and British Disabled Angling Association engages volunteers to help improve access for people of all abilities and backgrounds across a range of initiatives, like get hooked on fishing, and across all Regions. Each year over 2,000 young people, many at risk of drugs and crime, are helped toward their potential and a more environmentally conscious life through national volunteer projects.

Habitat restoration and protection – Each year hundreds of kilometres of river habitats are improved, opened up and protected by the volunteers of organisations’ like the river trusts, Wild Trout Trust and Grayling Society. In many cases these would otherwise be unaffordable or impractical to deliver.

- **Waterways** – In Southern, the Medway Valley Countryside Partnership runs regular volunteer activity for up to twenty people on heritage, habitat and countryside access work along the river valley. In Thames, the River Thames Society provide volunteer wardens who act as our “eyes and ears” along the river, whilst the Kingston River Boat Project utilise volunteers to enable disabled and disadvantaged people to enjoy and access the waterway.
 - **Monitoring** - Volunteers are engaged across a number of our monitoring activities including the River Fly Partnership, MarLIN marine species monitoring, the Angler’s monitoring initiative, Angler log book schemes and Freshwater Life. However, methodology concerns have prevented us from using much of this data officially.
-

SEPA

In 2009, SEPA started its citizen science (CS) workstream with the aim of developing a co-ordinated network of volunteer observers in partnership with other organisations that could collect basic environmental data to supplement the environmental monitoring that SEPA does. This type of monitoring would be used to screen the environment for potential problems; establish baseline conditions for environments that would otherwise go unmonitored, evaluate success of best management practices (e.g. river restoration project). In addition, engaging people in their environment will help increase their knowledge, understanding and stewardship in their local area.

To trial this approach and look to the future to expand this remit in the future we are piloting three workstreams in partnership with other organisations;

- **Education Scotland** – to engage 8 pilot schools in structured scientific surveying. SEPA would gain vital information about the environment from the student volunteers and it would encourage students to spend time outside exploring, studying and enjoying their local environment and community. Together, we hope to gain a much better understanding of the world around us and how to protect it. Current pilot project is looking at schools collecting rainfall and earthworm data (OPAL method) and work on sustainable flood risk management.
- **Riverfly Project** – a rapid assessment technique to assess river water quality through invertebrate larvae. In collaboration with Rivers and Fisheries Trusts of Scotland (RAFTS) and other partners. This initiative provides a simple yet powerful monitoring technique, which Riverfly partners can use to detect any severe perturbations in river water quality and, used alongside routine SEPA monitoring, ensures that river health is more widely checked and action can be taken at the earliest opportunity. This is already successful in England.
- **Littoral Seaweed Project** – rocky shore monitoring of seaweed to track water quality, invasives and climate change. We are working closely with BTCVs Natural Talent Apprentice (Seaweeds) based with SEPA Marine Science in Aberdeen, and also with beach clean volunteer organisations to record any alien species on our beaches. Contact has been made with “The Shore Thing” and “Big Seaweed Search” projects.

Vision for the future

SEPA and many other organisations collect environmental data to monitor and improve the environment of Scotland. No single organisation captures the full picture of all aspects of the environment around them. Through, properly designed and targeted projects that engage interest groups, we hope to collect additional data that will help fill these gaps. This data will be collected with many different partners as each organisation plays a different role from engaging the volunteers to taking potential regulatory action with the collected information.

It is envisaged that the Scottish Environmental Web (supported by LIFE + funding) that is under development will disseminate environmental data from SEPA and other official sources in a real-time online format. The website is being designed to contain a reporting portal (Citizen Science Portal) which will capture Citizen Science data, building a fuller picture of the state of the environment of Scotland. The role of Citizen Science in CAMERAS (Coordinated Agenda for Marine, Environment and Rural

Affairs Science) national monitoring strategy is also being researched. We hope that this workstream will build the foundations for SEPA engaging in this essential movement alongside partners such as SNH who are already very active in biological monitoring.

Scotland Counts Project (starts in August 2011)

Scotland Counts is a new and unique programme which seeks to develop the foundations for a Scotland wide Citizen Science movement. Scotland Counts continues the work established through the funding partners; SEPA, SNH and Scottish government and be based at BTCV Scotland. The programme will build on the legacy of BTCV Scotland's Wildlife Counts project and BTCV Natural Talent and Natural Communities programmes which provide year long apprenticeships in species conservation and community environmental engagement.

Scotland Counts will engage a wide range of communities and members of the public with environmental recording (eg. OPAL methods, rainfall recording, Bioblitz etc.) and increase their ability to understand, value and conserve the environment, thus helping to achieve 'greater involvement by communities in managing their local environment'. Helping to address the assertion that not enough of us consider our local environment to be our own 'responsibility - or opportunity - which dramatically reduces the potential for environmental conservation and enhancement'. The programme will achieve Smarter Scotland objectives by developing a distinctively Scottish approach to the acquisition of environmental recording skills, placing the individual at the centre of learning and promoting equal access to and participation in skills and learning for everyone.

In the first year, the Citizen Science coordinator based at BTCV will increase the potential of all organisations currently engaged in citizen science initiatives through:

- Developing an extensive knowledge and understanding of all existing citizen science activity throughout Scotland
- Establishing a Scotland Counts network to include the above organisations and develop and provide networking and sharing opportunities
- Ascertain the training and support needs of the above organisations
- Contributing to the development of the citizen science element of Scotland's Environmental Web to ensure that it is appropriate, accessible, and recognised, as a hub for citizen science for the above organisations
- Facilitating the development and delivery of existing and new citizen science initiatives through liaison with and coordination of partner organisations

Forestry Commission

My experience of working with volunteers involves the Condition Survey of Non-Woodland Amenity Trees which was variously funded by the DOE, DETR and ultimately the ODPM. A team of around 100 volunteers across England collected information on the health of groups of 30 amenity trees in their towns or villages, recording the presence of pests and diseases and other general indicators of tree condition. Other colleagues at Forest Research have asked the general public to fill in web-based questionnaires on the presence of specific diseases in trees in their local vicinity, and we have had more formal surveys of organisms such as butterflies.

We aim to encourage people to feel ownership of their trees (amenity, or forest) by partaking in such surveys as, the more involvement people have with their local

environment, the more likely they are to pass on their positive experiences, encourage people to use and expand their greenspace, and to look after their local environment.

Involving citizens in our more formal surveys isn't without problems though. I had significant difficulties retaining volunteers year on year in a survey where continuity of recording was important. I also suffered with low data return and had no real means to 'force' people to complete the survey for me. My other colleagues report that certain people had very fixed views on how data should be collected, or even had people whose 'diagnosis' was consistently wrong. Training volunteers can be a tricky element to any survey where people are not being paid to get things right. I'd very much like to discuss all of these issues at the meeting!

Natural England

How volunteers contribute to your current monitoring systems,

Volunteers are currently critical for our understanding of species trends and issues. We support this directly and indirectly via the NBN in order to both improve the flow of data from individual recorders to users, and to encourage data to be better quality and provided at greater spatial resolution.

Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make,

We are currently exploring new approaches to structured surveillance that would engage volunteers in new ways to assist in species surveillance. This is a response to the failure of current unstructured approaches to give us the level of geographic coverage and consistency required for statutory reporting and operational needs. Some of the key issues are that we will be looking for better 'sharing' of volunteer pools between taxon groups and the use of more rigorous surveillance approaches will require more training and support to volunteer networks. The benefits can include stronger feedback to volunteers on trends and issues regarding species; encouragement of greater breadth of taxonomic skills; collaboration between taxon societies/schemes; and adoption of new opportunities such as on-line recording.

Whether you believe there are collaborative opportunities and where?

Yes – to share the data derived from structured surveillance in order to understand the changes in species and the drivers of change. In addition to structured species surveillance we are also piloting structured habitat surveillance and a more extensive framework for long-term monitoring. Ideally we will be looking at co-locating species and habitat surveillance and thus secure good correlative data on biodiversity change and contextual data on environmental change.

These approaches provide an opportunity to look at alternative models for surveillance in the countryside (and urban areas!)

Any issues regarding citizen science for monitoring that you would like to discuss.

Join up of interests across government bodies – shared access to information derived from volunteer surveillance – capacity of volunteers (skills and numbers of people) – aspirations of volunteers themselves!

Joint Nature Conservation Committee (JNCC)

JNCC does not work directly with volunteers but invests in partnerships with those who do. Our main investments are through schemes led by the [British Trust for Ornithology](#), the [Centre for Ecology and Hydrology](#), [Butterfly Conservation](#), the [Bat Conservation Trust](#), the [Game and Wildlife Conservation Trust](#), and the [Wildfowl and Wetlands Trust](#), but these schemes involve the financial and in kind contribution of many [other partners](#), and in most cases depend on the huge contribution of time and effort by skilled volunteers. The value of volunteer effort in these schemes is estimated to be over 4 times the amount of direct funding. JNCC itself leads [monitoring of seabirds](#), with the support of many partners, and hosts results of the Seabird Monitoring Programme on its website. Further details are available from our website: <http://jncc.defra.gov.uk/page-3723>

JNCC also co-funds the Biological Records Centre (with the Centre for Ecology and Hydrology). JNCC and BRC staff have worked closely together to support the establishment of the National Biodiversity Network (NBN), including the technical work to set up the NBN Gateway as an internet portal to numerous biodiversity datasets.

Through surveillance and monitoring we record the status and trends of species and habitats and the pressures that affect them. The information gathered is necessary to help us identify any problems, target conservation action where it is most needed and measure the success of conservation effort. Further details are available from our website: <http://jncc.defra.gov.uk/page-3713>

Ways of gathering and analysing biodiversity data continue to evolve and we work with our partners to ensure we make the most of emerging techniques to maximise efficiency without compromising either the value of the data or the volunteer experience. At the moment we are looking at how volunteer effort might be better targeted (whether spatially or temporally) and, how to make best use of technology (online data entry, automated data capture etc.).

A specific area that volunteers could be used to address is helping to identify the meaning of ecosystem services (and what they mean to people). It is likely that this would involve collaborative research with other groups.

JNCC are keen not to reinvent anything that has already been done (or is being done) and believe it is important that when considering the opportunities for collaboration organisations are mindful of the current volunteer programmes and are not too demanding or instructive to voluntary organisation partners.

Countryside Council for Wales

CCW sees volunteer contributions to monitoring as increasingly important; volunteers can provide a means of taking forward projects requiring large numbers of people that would otherwise not be feasible. Further benefits arise in relation to environmental education and awareness. We work with volunteers both:

- 1) Indirectly - working through established schemes such as the various bird monitoring schemes, the UK Butterfly Monitoring Scheme and the National Bat Monitoring Programme. In addition, through agreements with organisations (e.g. Butterfly Conservation, BSBI) we support work to strengthen capacity of the volunteer community to bolster the recording of

particular taxa in Wales. (Levels of volunteer recording in Wales are lower than in England, and this currently constrains the usefulness of data obtained through these means.)

and,

- 2) Directly – usually in relation to specific projects and/or sites. Work on the Marine Nature Reserve at Skomer is a good example, where volunteers with diving skills and experience undertake largely non-specialist tasks (e.g. collecting and measuring). Smaller numbers of volunteers assist on an occasional basis with office-based work such as data entry. Volunteers with more specialist marine field skills (especially taxonomic) are few in number.

One aspiration in relation to existing schemes is to increase the number of suitably skilled volunteers in Wales so that such schemes can provide results that are robust at country level. Longer-term projects, with appropriate planning, lend themselves best to volunteer involvement, allowing for establishment and building of relationships with volunteers. Opportunities exist to develop collaborative arrangements with educational establishments and specialist groups (both natural history groups but also other outdoor groups e.g. diving groups) and with government training and work placement/experience schemes.

Scottish Natural Heritage

Background

Citizen Science (CS) is not a substitute for rigorous structured survey. Nevertheless, valuable information can be gathered if the questions are framed properly and the limits of the data collected are recognised. Citizens themselves can be involved in framing the questions.

At entry-level, the focus is necessarily on engagement rather than rigour, noting also the difference between data validation (what you would expect to see) vs verification (checking the capability of the recorder, e.g. via photographs). For example, iSpot is designed to inspire the next generation of recorders. It is not a recording scheme and its data are generally not suitable for uploading to NBN. It is nevertheless well suited to exploiting modern and commonly-available technology to record species observations in a straightforward and intuitive way.

The wider engagement of citizens contributing to knowledge of the natural world can have multiple benefits for enjoyment, education and environmental protection, leading also to a greater sense of awareness, appreciation and social responsibility.

How do volunteers contribute to surveillance in Scotland?

A Review of recording scheme surveillance information for terrestrial and freshwater species listed on UKBAP, HD and BD in Scotland was completed in April 2011¹. This confirmed that volunteers collect and collate data on a variety of taxa, from ad-hoc records to systematic schemes:

- Amphibians & reptiles – NARRS

¹ The draft report is not ready for release yet.

- Birds – SOC, BTO, WWT
 - Clubmoss, conifer, ferns, flowering plants, stoneworts – BSBI, Plantlife
 - Fish – Fisheries Trusts
 - Fungi – British Mycological Society, The Association of British Fungus Groups
 - Butterflies and moths – Butterfly Conservation Scotland
 - Caddis flies, may flies, stoneflies - The Riverfly Recording Schemes
 - Hymenoptera – BWARS Bees, Wasps & Ants Recording Society
 - Diptera – Malloch Society
 - Lichens – British Lichen Society
 - Bryophytes - British Bryological Society
 - Cetaceans – SeaWatch, Marine Conservation Society
 - Marine turtles - Marine Conservation Society, Herpetological Conservation Trust
 - Spiders - British Arachnological Society (Spider Recording Scheme)
 - Mammals – Mammal Society, Bat Conservation Trust, Cairngorms Wildcat Project, International Otter Survival Fund, Saving Scotland's Red Squirrels
- Records are commonly submitted to Local Record Centres, such as the Highland Biological Recording Group
- Notable exceptions are – annelids, lacewings, jawless fish, seals, beetles, molluscs, crustacean (FW), some marine organisms e.g. tunicates, coelenterates, algae, marine fish, crustacea (MAR)

Further aspirations for volunteers?

There is a shortage of suitably experienced personnel and amateur recorders for many taxa (notably lower plants, invertebrates, marine). After setting up an appropriate scheme for these sorts of species, there should be more opportunities for training for professionals so that they in turn can recruit amateur volunteers.

For species that are problematic to identify and/or survey (e.g. lichens), an approach may be to focus training on a few key species to extend survey coverage (e.g. recording cards for orange tip butterflies).

Provide guidance that could encourage volunteers to fill recording gaps (Bioblitz)

There is a need to promote the value of surveillance to conservation – this may be done through events (e.g. SNH Sharing Good Practice), the publication of Atlases (where volunteers can see their contribution), or providing guidance and equipment to promote recording.

The data that schemes and societies collect must be adequate for reporting on species status and trends. If not, we need to provide support to remedy this, and to work with the volunteers so they can see the purpose of collecting new or different data (e.g. habitat condition).

Collaborative opportunities

The Breeding Bird Survey diversification into collecting mammal records may be applicable elsewhere (e.g. amphibian recorders to look out for medicinal leech).

Addressing gaps in recording calls for collaboration and support.

Can we use habitat as a proxy for difficult to survey habitat specialist species? We could carry out surveys for these sorts of species rarely, and use more easy to identify (or remote sensing?) habitat variables to determine if the habitat for the species has changed on a more frequent basis? Therefore possible collaboration between e.g. BSBI and Butterfly Conservation.

SNH and academic partners can develop the science to support surveillance and provide/communicate this as a tool for volunteers. We can also provide feedback on the outcomes of volunteer surveillance effort.

Perhaps we can develop recording tools (apps) to help volunteer recording. This provided an opportunity to standardise the type of information that is recorded.

Shouldn't necessarily focus only on direct species/habitat surveillance and consider indirect methods. Re-photography of monitoring areas would be a good way to do this and could be incorporated into smartphone apps.

The Centre for Ecology and Hydrology (CEH)

The Centre for Ecology and Hydrology (CEH) has a remit that includes long-term environmental monitoring of terrestrial and freshwater systems and their interaction with the atmosphere. I have a long association with the Countryside Survey (CS), a national Government sponsored monitoring of Britain's rural environment. Up until now CS has been carried out by experts and to maintain quality and prevent accidental compromise of sample sites that is likely to continue, however, there are opportunities to extend CS using Citizen Science. Using iPhone technology it would be possible to collect additional information about species distributions (for plants targeted indicators, flagship species or invasive species and any animal information), land cover change (reporting differences to Land Cover Map), information on drivers of change (land management, extreme climate conditions, etc.), priority areas (including urban areas that are not currently surveyed) and to collect information about different perspectives on the state and future of the environment.

CEH is involved in a range of other monitoring exercises including Environmental Change Network, National River Flow Archive and National Hydrological Monitoring Programme, Predatory Bird Monitoring Scheme, UK Butterfly Monitoring Scheme (with Butterfly Conservation), UK Phenology Network (with Woodland Trust) and Biological Records Centre. The last four of these rely on volunteers to provide samples or information (David Roy, who is attending the meeting will cover these). Some collaboration with other organisations are well established and we are always pleased to investigate new opportunities.

Issues to discuss include the co-ordination, access to land, continuity/feedback, timeframe for reporting, health and safety.

CEH – Biological Records Centre

How volunteers contribute to your current monitoring systems,

The Biological Records Centre (BRC) works closely with >80 national recording schemes and societies, all of which act in a voluntary capacity. National recording schemes co-ordinate recording of specific taxonomic groups (e.g. ranging from Butterfly Conservation to Botanical Society of the British Isles to the Carabid

recording scheme) – for full list see http://www.brc.ac.uk/recording_schemes.asp. BRC support national recording schemes and societies in a number of ways including: data management, quality assurance, development of standards, web hosting, support for data capture (including online recording), analysis and interpretation, reporting (papers and distribution atlases).

BRC support the development of the GB Non-native Species Information Portal (GBNNSIP), interacting with a number of volunteer recording schemes to collate information on invasive species and to promote recording. We help run the Recording Invasive Species Counts (RISC) system to promote recording of non-native species by the general public.

BRC also co-ordinate the operation of the UK Butterfly Monitoring Scheme (UKBMS) with Butterfly Conservation, and with support from BTO. The UKBMS comprises two elements where population abundance of all butterflies is measured each year: >1000 sites monitored intensively plus 750 randomly 1km squares monitored less intensively.

Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make

BRC has operated for almost 40 years, working closely with volunteer recording schemes. The focus for the next 5 years is to continue to support these activities. We are investing in online tools to support biological recording by volunteers (including the general public). We have developed (with the NBN) the Indicia system that has/is being used for volunteer recording, including the support of Citizen Science projects (BBC Breathing Places, RISC, National Moth Night 2012 etc). We have aspirations to promote Indicia as a tool to improve the quality of volunteer recording data – this includes the aim to work with others to develop smartphone applications for recording data to an Indicia data warehouse. We see benefits of a citizen science approach where there is a specific science question to address and data quality can be assessed.

Whether you believe there are collaborative opportunities and where?

We believe that, for some species groups, there is scope for more standardised approaches to monitoring by volunteers. Two areas where there are collaborative opportunities are vascular plant monitoring (with BSBI and PlantLife) and pollinator monitoring (with Bees Wasps and Ants Recording Scheme, Hoverfly Recording Scheme, Butterfly Conservation).

Any issues regarding citizen science for monitoring that you would like to discuss.

Clarity on scope of citizen science for monitoring. Support for national recording schemes and societies. Capacity for more standardised approaches to monitoring by volunteers.

National Biodiversity Network

How volunteers contribute to your current monitoring systems

The majority of species distribution data made available via the [NBN Gateway](#) have been generated by volunteers. These data are used to some extent to inform the monitoring systems of NBN Partners such as the Country Agencies. In addition to gathering species distribution data, volunteers play a vital role in data validation,

verification and digitisation within the infrastructure provided by National Schemes and Societies and Local Record Centres.

Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make

It is hoped that online recording will create opportunities both to facilitate broader participation in gathering biodiversity data and to target recording effort to gather data with the purpose of answering specific environmental questions, for example about climate change, ecosystem services or invasive species.

Volunteers have contributed less to habitat recording than to species recording in the past – new technology (e.g. cameras and phones with inbuilt GPS, online interactive mapping systems) could provide opportunities to increase their contribution.

Whether you believe there are collaborative opportunities and where?

The collection, verification and mobilisation of species data by volunteers requires collaboration between (at least) National Recording Schemes and Societies, Local Record Centres, the Biological Record Centre, the NBN Trust and public sector funders at a national and local level. Country Agencies are already collaborating on more coordinated funding streams for biological recording at a national level. It is vital that collaborative opportunities include Local Authorities as well as national organisations as they rely heavily on biodiversity data provided by volunteers. Despite devolution, there are opportunities for UK-wide collaboration or at least sharing of best practice, for example in data modelling or standardised surveillance and monitoring methodologies.

Any issues regarding citizen science for monitoring that you would like to discuss.

It would be useful to clarify our understanding of the term citizen science in the context of this meeting. Its original meaning was the engagement of non-scientists in true decision-making about policy issues that have technical or scientific components. Now it is mainly used to refer to large ‘crowd-sourcing’ projects such as the Harlequin Ladybird Survey, Evolution MegaLab, Big Garden Birdwatch or OPAL surveys, which enable members of the public with no particular scientific expertise to contribute data. Are we using the term citizen science to cover all data capture by volunteers? ‘Amateurs’ with an extremely high level of taxonomic expertise might find the term citizen scientist patronising. Participants in crowd sourcing projects will have no objection to their data being shared and used, whereas expert ‘amateur’ recorders might take a more active interest in how and by whom their records are used, and might need reassurance that records of sensitive species or sites will be handled correctly.

There are two approaches to using volunteer data for environmental monitoring:

- (1) ‘Data mining’ including interpretation and modelling to make use of data that have been gathered by volunteer recorders according to their own interests.
- (2) Targeting volunteer effort from the outset to gather the requisite data for environmental monitoring.

What are the comparative costs/benefits of these two approaches?

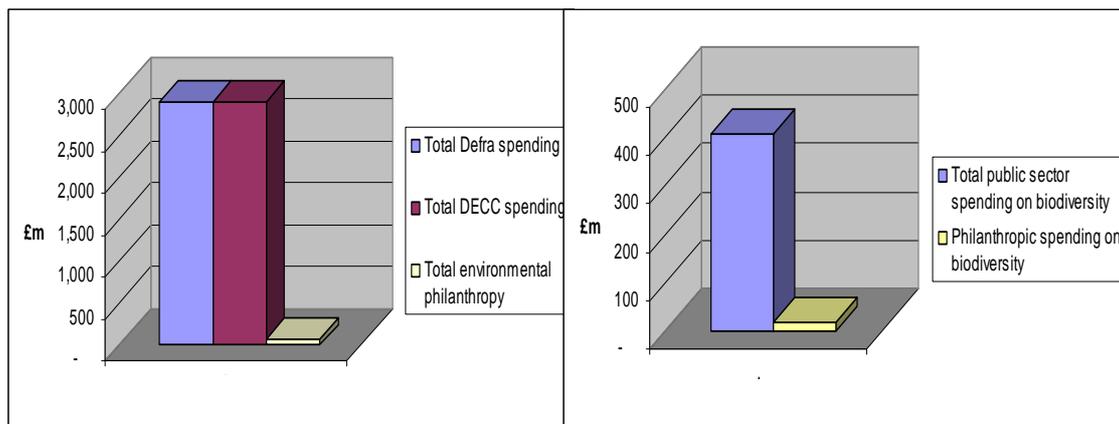
There are concerns about data quality from citizen science projects. NBN Record Cleaner has been developed with verification rules provided by national recording schemes to help data managers screen large species distribution datasets for anomalous records more efficiently.

Web mapping is a good way of providing feedback to volunteer recorders, showing them their data in the context of other environmental data. Licensing issues around the use of OS and UKHO maps can be a barrier to the use of web mapping (OS-derived data on Google maps).

Volunteer data are not 'free' – investment is required to maintain and develop the infrastructure that supports biological recording. “[They] quickly realised that there was a great deal of demand ... for community engagement and a desire for the opportunity to genuinely improve their local district. However, what was needed was the infrastructure and financial support to enable these good intentions to yield concrete results. Case Study: The Seattle Neighborhood Matching Fund, Giving White Paper 2011

Do volunteer data always provide the best value for money? What are the limitations of volunteer data for environmental monitoring? Is the collection of data for environmental monitoring a job for 'professionals' rather than 'amateurs'? IEEM President Penny Anderson asked the question at the recent IEEM Conference on Biodiversity and the Big Society “We wouldn't have amateur doctors, dentists, air traffic controllers...should we have amateur ecologists?”

Philanthropic support for citizen science biodiversity projects cannot fill the gap created by public spending cuts. “Philanthropic organisations won't replace statutory funding or fund statutory bodies. Philanthropic funds are already committed, in demand, and under pressure.” This quote and the graphs below are courtesy of Nick Perks, Environmental Funders Network.



British Trust for Ornithology

How volunteers contribute to the BTO's current monitoring systems?

Volunteers are fundamental to the BTO's monitoring programmes. Over 40,000 volunteers currently contribute data to our comprehensive suite of schemes, notably the Breeding Bird Survey, Wetland Bird Survey, Bird Atlas, Nest Records Scheme, Ringing Scheme, BirdTrack, Garden BirdWatch, and many others. Not only is the quantity of data submitted impressive (almost 20 million records were submitted in 2010 alone), but the majority of these records are not simple "casual records", but are collected via structured survey methodologies, enabling robust conclusions to be inferred and high-quality scientific research (for example, into habitat management, effects of climate change and causes of species declines) to be undertaken. Our volunteers are not only engaged in data collection, but our "regional network" is a group of about 150 experienced county-based experts who form a critical component

of our national organisational structure. It is important to note that the BTO's volunteer network has not sprung into existence overnight, but is the result of many decades of intellectual and financial investment, both by the BTO itself, and in collaboration with partner organisations. Many of the key schemes listed above arise from valued and highly effective partnerships with JNCC and the individual country agencies, RSPB, WWT, BirdWatch Ireland, the Scottish Ornithologists' Club and others.

The BTO's further aspirations for volunteers – the benefits and gains we are looking to make

The BTO will continue to rely on its volunteer network for monitoring for the foreseeable future. Not only is maintenance of the key annual monitoring schemes vital for delivering key annual indices and indicators, but we plan to continue our long-running series of more focussed single-species surveys; for example, a new national survey of Nightingales will take place in 2012. Moreover, whilst the majority of our survey work is likely to continue to involve "old-fashioned" fieldwork, we also anticipate recent technological advances (mobile phone applications, satellite-tagging of individual birds, etc) to be reflected in the way our volunteers help us to collect data. Additionally, our aspirations are not just in terms of what we want from our volunteers, but also in terms of improving their experience whilst volunteering for us, notably through enhanced feedback.

Collaborative opportunities with BTO volunteers

Whilst most BTO work is focussed on birds, our volunteers already provide valuable information on other taxonomic groups. For example, over 75% of Breeding Bird Survey (BBS) participants also submit data on mammals, allowing reliable trends to be produced for many of larger (and ecologically important) species, thus forming an important component of the Tracking Mammals Partnership. Moreover, BBS volunteers are now being asked to visit their survey transects on two additional days to record butterflies as part of the Wider Countryside Butterfly Survey (in partnership with Butterfly Conservation and CEH). Garden BirdWatch participants also record mammals, herptiles and a range of the more recognisable insects in their gardens. We are now considering possibilities for allowing recording of other wildlife through BirdTrack, and will soon be assessing the results of a questionnaire we circulated to assess the potential interest in such a capability.

We feel there is great potential for extending the BTO's experience in volunteer-based monitoring to other taxonomic groups. Many of the underlying issues in survey design and organisation of volunteers are similar across all areas. Moreover, many BTO volunteers (and staff) are keen and experienced recorders of other wildlife groups already. However, we think it is critical that we continue to work in partnership with people who have expertise in these other taxonomic groups, rather than simply "going it alone". As part of this ethos, we have held regular meetings with representatives of other recording schemes, and held a multi-taxa monitoring workshop at BTO headquarters in 2009.

Further issues regarding citizen science for monitoring

Using volunteers for monitoring is unquestionably valuable. However, there are some potential issues we feel it important to emphasise.

Firstly, the term "citizen science" can tend to suggest that all citizens are equal in their potential for contributing to biodiversity monitoring. This is clearly not the case. Even within the bird monitoring community, there is a wide range of expertise, with only the more experienced really able to contribute to the Breeding Bird Survey, for example. The situation for the majority of other taxonomic groups is clearly far more

extreme; the successful public UK Ladybird Survey, for example, does not mean that we have equivalent monitoring of all other beetles.

Moreover, there is a world of difference between the collection of casual records, and the collection of data via science-led structured survey methodologies. Whilst there is nothing inherently wrong with the former, the uses to which these data can be put are limited and there are dangers of misinterpretation by end-users not familiar with the lack of data collection protocols.

There is also a concern that citizen science could be seen in some quarters as getting monitoring done in a low-cost way. Whilst there are certainly great efficiencies to be made in utilising the skills and enthusiasm of volunteers, this is not something that comes for free. To realise the benefit of volunteer-based monitoring requires infrastructure, staff, communication, meetings, an online presence, etc. Importantly, it also requires time; unlocking the benefit of volunteer recorders is not something that can happen overnight. Understanding the motivations of volunteers is critical and an entirely top-down approach is likely to be highly counter-productive in most cases. Most successful volunteer-based wildlife monitoring has originated from the recorders. In the BTO's case, there is a strong influence of volunteers through the running of the organisation, including within the trust's governing Council.

With the development of the internet over the last 15 years, there has been an explosion of online citizen science projects where the public have been encouraged to submit observations of particular species, generally with the implicit or explicit promise that this will help with conservation. Many of these initiatives have not been designed in such a way as to allow robust inferences to be derived. Perhaps more importantly, in many cases, there is little infrastructure in place to provide more than cursory feedback to participants, to maintain interest past the initial point of data entry, or to translate the results into meaningful action. This could be a problem if it becomes demotivating to people who might otherwise become more strongly engaged in wildlife recording. It can also be a problem if a perception grows (amongst funding agencies) that the existing long-term structured monitoring programmes are no longer necessary.

However, where such initiatives can be helpful is in long-term strategic capacity building, by inspiring a new cohort of volunteer wildlife recorders. This is really vital, especially in times of many people becoming increasingly disconnected from the countryside. Examples such as the BBC's Springwatch/Autumnwatch, and the iSpot website, are excellent examples of ways in which expertise and capacity can be built up, and the BTO is completely supportive of such initiatives. The important point however, is that having inspired and engaged new observers, there should be structures in place to help these people progress further along the path of meaningful wildlife monitoring.

RSPB

How volunteers contribute to your current monitoring systems?

Volunteer contribution to RSPB monitoring is probably best considered in three components:

1. Dedicated, expert volunteers who commit considerable amounts of time to specific research and monitoring projects. This ranges from single-species experts (e.g. members of 'Raptor Study Groups') who assist with research

- projects and national single species surveys, to those assist RSPB staff in monitoring birds and other biodiversity on RSPB reserves.
2. Those who are involved in less intensive projects, or those that require a lower level of expertise but still require a considerable time contribution - the Beached Birds Survey and the Volunteer & Farmer Alliance being two examples.
 3. The participants in the large, high profile citizen science projects that the RSPB conducts, such as 'Big Garden Birdwatch'. These projects do collect data with scientific merit (although by and large we have not exploited that to its potential) but more obviously serve various other purposes do with public engagement.

Note that as we are partners in national volunteer-based monitoring schemes (such as the Breeding Birds Survey) run by the BTO, we also look to promote participation in these schemes.

Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make.

We have many aspirations for the development of citizen science - on to maintain and grow our interactions with dedicated volunteer experts, to improve the rigour of surveys, increase the breadth and scope of the large-scale projects (and increasing the scientific use of the data collected) and to use such projects as a conduit to draw people into more detailed, scientifically rigorous projects.

Whether you believe there are collaborative opportunities and where?

Yes. In particular, I think the RSPB would be willing to engage with citizen science on a wider range of taxa than just birds - there has been some dabbling in this recently - but would be best doing this in partnership with others with specific expertise that could be combined with our ability to recruit large numbers of volunteers.

Any issues regarding citizen science for monitoring that you would like to discuss.

For discussion, I'd be interested in discussing how to handle the tension between making citizen science projects accessible enough to attract good numbers of participants (thus getting a good sample size, as well as meeting other goals such as organisational promotion, engagement etc) but still managing to collect worthwhile data.

The Open Air Laboratories (OPAL)

The Open Air Laboratories (OPAL) network is an exciting initiative of a wide range of local and national programmes to encourage people from all backgrounds to get back in touch with nature, at the same time generating valuable scientific data concerning the state of our environment.

How volunteers contribute to your current monitoring systems?

This is mainly done by getting people to explore, study, enjoy and protect their local environment, by bringing scientists, amateur-experts, local interest groups and the public closer together, so that environmental issues of local and global relevance are explored. A total of 15 partners are working together to deliver a total of 31 projects. Central to OPAL are six surveys across England to learn more about the state of our environment, exploring the health of our soils, the quality of our air and water, the distribution of invertebrates, the importance of hedges, and the ways in which we

affect our climate. All ages and abilities can take part and your contribution will be important in helping scientists build up a picture of England's natural environment. It provides easy-to-follow survey instructions and all the support the public needs. Data is submitted via the web and instantly mapped.

Further aspirations for volunteers and the benefits we are looking to make

With the need for this evidence based policy, and the emerging recognition that involving the public in environmental monitoring activities is an effective way of increasing understanding of issues and commitment, there has been growing interest in 'citizen' surveys.

The OPAL National Soil and Earthworm Survey is a good example of such an approach, with data on soil characteristics generated by this survey used to prioritize the need for further soil assessment.

Findings demonstrate that with strategic planning of the civic participation activity, this approach can deliver improvements in the quality of the evidence collected and effective public involvement in policy decision-making and implementation, on top of direct educational benefits to the public.

Issues regarding citizen science for monitoring

Although there are established weaknesses with citizen science, the approach followed is quite different. The public is contributing to a systematic effort coordinated by a University, rather than directly producing data as outputs. For the OPAL soils survey for example, participants findings compliments research Imperial College is carrying out into soils and soil quality. Research is focused on the interaction with pollution, other environmental media, and human and ecosystem health. The effect of anthropogenic activities including waste and land management practices to soils is an ongoing research theme that attracts the public attention and benefits from data generated by its engagement.

British Geological Survey

Did you feel an Earthquake? This 'citizen science' project has been in operation for at least 4 decades. It is based on the use of simple observations on the intensity of earthquakes that can be provided by non-specialist eye witnesses. Along with many other countries in the developed world, the UK operates an instrumented network of seismic monitoring sensors that can measure the intensity and spatial location of earthquakes and share the data in global networks. However, the impact of an earthquake at the earth's surface, including the damage caused, is influenced by a range of other local factors including the shallow geology, quality and style of building construction etc. This impact is measured by the macroseismic intensity scale, which is rather similar in concept to the Beaufort Scale for wind storm intensity. The macroseismic intensity scale relies on simple observations of the intensity of shaking, damage to buildings, behaviour of people and animals etc. 'Did you feel an Earthquake' uses a public questionnaire which poses simple questions to the public on their experience of an earthquake, enabling them to provide objective answers that feed directly to into a databases, serving both mapping of earthquake effects and follow up research on mitigation and preparedness. The questionnaire is now web enabled and alerts encouraging the public to contribute are issued following UK quakes using press releases, links from media websites including the BBC, and appeals via social networking sites such as Facebook. With web technology, we are no longer capacity limited in terms of the data we can process, so the more data we gather, the better. Prior to the web, questionnaires were sent out by post. This

approach also enables recent earthquakes to be compared with historical events prior to installation of instrumentation.

<http://www.earthquakes.bgs.ac.uk/questionnaire/EqQuestIntroA.html>

Volcanic ash collection network. This was established by BGS following the eruptions of the Eyja and Grimsvotn eruptions in Iceland during the last year, and the resulting disruptions to air travel. The objective is to gather information on the type, composition and grain size of ash particles falling on the UK to assist modelling of ash transport in relation to eruption style, duration and intensity. Samples are gathered using a variety of media including rainwater for volunteer operated weather stations, and petri dishes and sticky paper distributed to schools (including Schools Seismology outreach project – see below). The project provides highly useful data but each sample needs analysis by scanning electron microscope, so capacity is limited in terms of the number of samples we can deal with.

<http://www.bgs.ac.uk/discoveringGeology/hazards/volcanoes/grimsvotn2011.html>

We also have a simple e-mail questionnaire aimed at the public to capture more general ash observations, along similar lines to Did you feel an Earthquake?

<http://www.quakes.bgs.ac.uk/questionnaire/VolQuest.html>

Schools Seismology

This is an outreach project, co-ordinated by BGS but involving many other partners including the British Association, to broaden understanding of earthquakes and other natural hazards and science concepts in general among schoolchildren. It also involves installation of simple seismometers in partner schools, allowing data to be shared with other schools worldwide, as well as with established national and international monitoring networks.

<http://www.bgs.ac.uk/schoolseismology>

Other projects

We are developing a range of other initiatives for crowd-sourcing data based on web and smartphone technology. These new technologies provide excellent new opportunities for citizen science, but the successful ones are likely to be those that gather simple, objective data driven by science needs.

Met Office

The Met Office has a long history of working with the voluntary community and remains dependent on their support for important components of our observing network including observations from > 200 UK climate stations and the volunteering observing ship fleet. Observations quality is assured by providing equipment, training and undertaking regular station visits. More recently we have taken steps to increase the amount of less 'formal' public data we obtain in real time to support our forecasting process particularly to verification purposes. Earlier this year we launched a new Weather Observations Website (WOW - <http://wow.metoffice.gov.uk/home>) which is proving very effective; after the first 20 days over 500 observing sites had been registered and within the first 2-months over 2 million observations had been submitted.

Royal Meteorological Society

The Royal Meteorological Society have around a couple of thousand members who make observations or monitor the Weather and Climate. Many record this in a variety of ways and have the potential to contribute more significantly than many are already doing to national science programmes. As well as belonging to the Society some of those citizen scientists also belong to other organisations across our community such as the Climatological Observers Link (COL, <http://www.met.rdg.ac.uk/~brugge/col.html>), the Thunderstorm and Tornado Research Organisation (TORRO, <http://www.torro.org.uk/site/index.php>) and the Group for Earth Observing (GEO, <http://www.geo-web.org.uk/>).

The RoyalMetSoc has also recently been involved in an AHRC project called Cultural Spaces of Climate, led by Dr Georgina Endfield at the University of Nottingham, and this also considered the wider aspects of the role of amateurs as citizen scientists.

Other projects which may be of interest:

- Weather Observations Website (<http://wow.metoffice.gov.uk/> joint project with the Met Office, the Department for Education and our Society) – to encourage observations from weather and climate stations to be sent in to provide additional valuable information to the existing national observing network.
- OPAL campaign on observing contrails for climate model validation (<http://www.opalexplornature.org/Contrail-results-analysis>)
- The Weather Club is a subsidiary charity of the Society and has over 1,200 members <http://www.theweatherclub.org.uk> - theWeather Club is running its second Great British Weather Experiment collecting observations from across the country.
- The Society also run two sizeable Urban Heat Island projects, in Reading and Manchester, involving local schools and communities
- There are a number of local community groups under various initiative headings who are looking to do more in their local communities around observing and monitoring that the Society has been in contact with over recent months, including the North East Councils and the London Climate Change Partnership

Considerations:

- This data should be archived and made more widely available as a community and national resource – and for weather and climate. BADC seems a natural home.
- Local communities are not engaged as actively as they could be by Local Authorities in providing a community response to this, perhaps working with Professional and Learned Societies. They are often valuable projects for local communities and authorities to engage in – is it possible to spread interesting project ideas across local authorities/communities?
- Too many Schools are given automatic weather stations under large funding projects which is wasted investment - the schools do not know how to make effective use in the medium to long term of this equipment which rapidly becomes unusable for a variety of reasons. Better National co-ordination of monitoring equipment in schools is needed along with understanding of how we can put networks in place that ensure this investment has longer term value.

Third Sector Research Centre, University of Birmingham

Volunteering is a popular activity. Most of us get involved in some form of volunteering over the course of the year – in 2009/10 66% of the population volunteered, with 25% undertaking formal volunteering (within an organisation) on a regular (at least once a month) basis. Volunteers undertake roles as diverse as football coaching, mentoring, school governance and maintenance of green spaces. Although the scale of involvement is not known, considerable numbers of volunteers engage in environmental observation and monitoring activities – collecting data on the number and diversity of birds in given areas for the RSPB; recording rainfall levels; counting butterflies; or monitoring the newt population in the local ponds.

Interest in volunteering is currently high. Volunteers are central to the Big Society agenda. The potential of volunteering to contribute to civil renewal; service delivery; economic, social and personal development; mental and physical well-being is well recognised. The current and previous administrations have developed a plethora of initiatives to grow and support volunteering.

There are, however, a number of challenges facing the volunteering movement. Levels of volunteering are static, despite efforts to increase participation. Inclusivity can be an issue, with volunteers being drawn disproportionately from certain groups of the population. Developing meaningful opportunities for volunteers, that are distinct and complementary to the roles of paid staff, and that are rewarding for all those involved, can be more challenging than often assumed. Finding the best ways of supporting volunteering can also be an issue – with the tendency to introduce ever more formal ways of organising and ‘managing’ volunteers creating a risk that it becomes over bureaucratic and off putting. The level of resources dedicated by many organisations to supporting their volunteering programmes is woefully lacking and are now more stretched than ever, with the parallel contraction in volunteering infrastructure services further squeezing the provision of support for volunteering. These issues and challenges are not particular to the involvement of volunteers within environmental monitoring and observations, but they are likely to play out in that field and to require careful consideration if the involvement of volunteers is to be enhanced. The opportunities to enhance the role of volunteering within monitoring and observation are considerable, but so is the need to work together to overcome the challenges.

European Environment Agency

“The European Environment Agency (EEA) is an EU agency providing independent information on the environment across 38 countries. It is a major information source for those involved in developing, adopting, implementing and evaluating environmental policy, and also the general public. Eye on Earth is a GIS platform developed by EEA with Microsoft as an interactive tool for presenting and allowing uploading of information about the environment. One of the aims of Eye-on Earth is to engage the public and allow citizens to participate through the provision of data about their local environment. Currently the public can upload information or feedback on bathing waters and air quality - this will soon be expanded to cover noise, waste, and the natural environment. EEA is keen to encourage citizen participation, for example through the use of smart phones with GPS, cameras and perhaps specialised sensors. EEA is currently running a citizen science project on invasive alien species (IAS) to test new ways of monitoring them, to create a pilot with a longer term vision for IAS and raise awareness of the issues. We` are keen to collaborate with organisations on this project – please contact Ian Davidson

(ian.davidson@eea.europa.eu) or Malene Bruun (malene.bruun@eea.europa.eu) to find out more.”

Marine Biological Association

There are numerous marine initiatives aimed at community engagement. Examples include various activities run by University of Newcastle, Dove Marine Laboratory, Marine Conservation Society (Beachwatch), Seasearch, the Great Eggcase Hunt (Shark Trust), Seawatch (Seawatch Foundation), Big Seaweed Search (British Phycological Society) and the marine recording scheme (Porcupine Natural History Society).

However the greatest range of marine education programmes is delivered by the Marine Biological Association mainly through the Marine Life Information Network (Marlin) and the Data Archive for Seabed Species and Habitats (DASSH). The outreach work fits with the charitable aims of the MBA to “**Advance marine science through research, communication and education**”.

The MBA citizen science programmes can be broadly categorised into two areas 1) education and outreach programmes that promote awareness and 2) those specifically aimed at recording. Examples are given below but this is not an exhaustive (e.g. it does not include numerous schools talks and public lectures the MBA has delivered or regular targeted outreach activities such as National Science and Engineering week). The MBA has also produced a large number of ID guides and other material in order to facilitate citizen science engagement.

Education and outreach

- **COWRIE** - Online resources and curriculum-linked material including interactive workshops for schools to inform the public about the interactions between offshore wind farms and marine life (see: www.offshorewindfarms.co.uk). The project is due for a major expansion in 2011/12.
- **Shore Thing** - there have now been over 100 surveys undertaken as part of the Shore Thing project which engages ‘A’ level students in climate change surveys on the rocky shore (now in 5th year). Significant results have been produced from this project including the first record of *Sargassum muticum* on Rathlin Island, Northern Ireland in 2009.
- **Sealife Survey** - national project engaging the public in marine life recording. Sealife survey provides online recording and information. The MBA also sits on the Seasearch national group (a dedicated diver led habitat survey). Three national recorders conferences have also been held and we are looking for funding to run another and create a marine educators network.
- **Batten Bay: A Breathing Place for Plymouth** - The Breathing Places project is a campaign which has inspired people throughout the UK to enjoy and care for wildlife and natural spaces. We developed signage and a programme of events for Batten Bay, Plymouth
- **European Monitoring Network** – we have been working with key partners in Portugal, Poland, Sweden, Belgium and Greece in developing a European Network of Marine Educators and recording. We have successfully trialled a European Marine Biology Summer School comparing techniques and practices. We are looking for European funding to develop a network.

- **Alien Invaders** – Involves volunteers and school children (KS2 – 4) in the collection of distribution data for selected non-native marine species, selected for their ease of identification and presence intertidally. Data has contributed to a number of publications and reports and has increased our knowledge of the distribution of these species. We are the portal for marine records for the GBNNSIP. The alien invader scheme has been further developed to monitor alien spread in marinas using settlement plates.
- **BioBlitz** – The first marine Bioblitz in the UK was undertaken in partnership with the Natural History Museum and local partners in 2009 at Wembury with support from the National Trust and Open Air Laboratories (OPAL). The event generated 700 species records. We have followed this up in 2010 on the Erme Estuary and in 2011 we will undertake a marine Bioblitz at the Mount Edgcumbe Estate. Bioblitz is very much a partnership activity attracting experts from many organisations to interact with the general public and schools. With OPAL we produced a guide to running Bioblitz.
- **Seashore Safaris** – we run a number of school and public seashore safaris and have trained other groups in how to deliver them. They are by their very nature (taking people out on the rocky shore) a local activity and we restrict our activities to Devon and Cornwall but have helped out further afield.
- **Snorkel Safaris** – Marlin has developed a programme of snorkel safaris working with young adults. In 2011 we, in conjunction with BSAC, ran the first Snorkel Safari Training Course for those who want to deliver snorkel safaris elsewhere.
- **The Blue Sound** project is an exciting unique outreach initiative connecting deprived areas of Plymouth with the Plymouth Sound and Estuaries European Marine Site thus engaging local people with their marine environment. This is an 'Access to Nature' funded project. Projects have included a fishing night, snorkel safaris, beach suppers and beach rangers. The projects generate marine life records.
- **SHARC Volunteers** - The MBA runs the SHARC (Surveying Habitats and Researching Coasts) volunteer group. A group of young people who provide voluntary support to MBA staff in research and education activities, as well as undertaking survey work to increase awareness of species distribution locally. Records are passed into our archive.
- **Marinexus** – working with the Roscoff Marine Laboratory, France we are developing a series of outreach programmes including taking students on a research boat trip, algae days and seashore safaris. One of the primary areas is looking at non natives and monitoring their spread on both sides of the channel.
- **Training courses** - MarLIN provides training courses for educators and volunteer recorders in marine life education, species identification and recording.

Recording

- **Big Recording** – a DASSH-led project, funded by MEDIN, to provide the database infrastructure and online recording capability of marine recording schemes, in order to improve and speed up data flow between existing schemes (e.g. Shark Trust, NMA Fish Recording), DASSH and the NBN, while retaining recording scheme autonomy.
- **Strandlines workshop** – MarLIN and Buglife organized a workshop to look at the recording needs for strandline biodiversity and to explore funding mechanisms to improve recording and conservation of strandline flora and fauna.

- **Welsh Fish Recording** – a DASSH led project to develop a web-based front end to enable fishermen and anglers to record sightings and catches of fish, including rare species, in Wales.
- **Isles of Scilly ID Guide** – part of a series of waterproof ID guide to the marine life of the Isles of Scilly was produced to aid marine life recording was produced in collaboration with the Wildlife Trusts of the Isles of Scilly and Cornwall.

How volunteers contribute to your current monitoring systems: The volunteers contribute directly through online recording. Data is collated from events and ongoing citizen science monitoring and is archived in DASSH and made available through the National Biodiversity Network (NBN).

Whether your organisation has further aspirations for volunteers – the benefits and gains you are looking to make: The MBA is looking to expand its citizen science activities by increasing community involvement and by rolling out across the UK some initiatives that have been successfully trialled locally. There is also an aim to re-launch the Sealife Survey programme, further develop the web based portals such as the non-natives portal and to roll out a non-natives programme focussed on marinas once funding is agreed. The MBA also wants to run a national workshop to discuss citizen science in the marine environment and enhance the coordination of these activities.

Whether you believe there are collaborative opportunities and where? Nearly all of the activities the MBA carries out are undertaken in liaison with other organisations. This is magnified in the Bioblitz we have run where both terrestrial and marine groups, local and national come together.

This collaboration will increase if programmes such as Blue Sound are to be initiated at a national level.

Any issues regarding citizen science for monitoring that you would like to discuss. It is important to note that both strands of activity (education and outreach and recording) are important. Awareness proceeds engagement. There are resource issues involved in all these activities such as producing good quality ID guides, providing training and coordination and data Quality Assurance (QA), storage and analysis. The QA issue is always seen as key in maximising the effectiveness of data collected by volunteers. The MBA has developed QA procedures and also encourages good practice such as providing photographs.

With resource funding local communities could be engaged to monitor their shores. Such a scheme has been successfully piloted in several places but not resourced nationally. We would like to provide training to groups, link marine ecologist specialists, provide resources and archive data on a national scale.

A key difference between marine recording and freshwater/terrestrial is that many marine programmes are habitat/biotope based rather than taxa specific i.e. recording non-natives, climate change indicators or listing species in an area. Terrestrial monitoring has mainly taxa focussed groups (birds, butterfly etc).

Greenspace information for Greater London (GiGL) / Association of Local Environmental Records Centres (ALERC)

What is the Association of Local Environmental Records Centres (ALERC)?

ALERC, formed in 2009, is an association between the Local Records Centres of the British Isles. The Association aims to provide a central voice for the views and concerns of the record centre community, whilst building a support-based network of knowledge and advice to meet the needs of its members.

What is a Local Records Centre?

Local Records Centres (LRCs) are organisations that collect, collate, manage and disseminate information relating to the biodiversity and geodiversity of a region on a not-for-profit basis. This information plays an essential role in decision-making at all levels, and its use helps to protect and improve biodiversity and geodiversity within the region and beyond.

What is GiGL?

Greenspace Information for Greater London (GiGL) is the capital's environmental records centre - we collate, manage and make available detailed information on London's wildlife, parks, nature reserves, gardens and other open spaces.

GiGL have hosted/ co-run approximately 20 on-line surveys, mostly with borough partners, and this service has proved very popular as it allows partners to promote their survey, generate interest and not have to worry about technical aspects of web-form development and data processing. GiGL also create bespoke outputs from survey results.

These surveys are not generally generating data from standardised surveys and therefore it is hard to use data for monitoring purposes. They are however generating useful snapshot datasets, particularly with regard to easily identifiable species such as stag beetles, house sparrows and hedgehogs.

GiGL also undertake other work with more expert volunteers; supporting local recording groups, supervising long-term data entry volunteers etc. From this experience it is known that volunteers get involved for a wide variety of reasons and it is therefore not possible to easily characterise different volunteers.

Some local records centres have very sophisticated online recording systems (e.g. RECORD in Cheshire and COFNOD in north Wales) that are designed to engage local volunteers, provide feedback and a means to assist with data verification.

When developing surveys, organisations (in particular the large National organisations) should consider LRCs, who could help to build capacity as well as provide technical and statistical support in analysing outputs. Data validation and verification are key topics for discussion within the National Biodiversity Network and LRCs have a role to play in the validation of data, from provision of standard site gazetteers prior to the survey being run to checking of data once generated.

Annex D – Session 2: Considerations and Challenges Transcripts

Practicalities

Issue/Challenge	Solutions	Actions
<p>Cross Partner/Sectoral working</p> <ul style="list-style-type: none"> - Best working practice - Political barriers (department remits/scope e.g. FC/FR working in urban areas) <p>Collaboration – BUT safeguarding existing volunteer base.</p> <p>Procurement/Contracting</p> <p>Licensing (e.g. Mapping)</p> <p>Trespassing issues</p> <ul style="list-style-type: none"> - Publication of voluntary data & associated metadata - Volunteers entering private land 'on behalf' of an organisation's survey. <p>Legal Issues</p> <ul style="list-style-type: none"> - Data Protection Act - IPR - Liability 	<p>To bring all information, from across different sectors, together – MY ENVIRONMENT and the Scottish ENVIRONMENT WEB should help with this.</p> <p>The Field Studies Council (FSC) are leaders on guidance (ID) and also on engagement.</p> <p>POLITICAL BARRIERS – Liaise/work alongside groups who are able to work in certain areas (such as the urban environment).</p> <p>Must identify the gaps and where there are suitable opportunities for volunteers to help. The opportunities for contributions by Citizen Science could be explored for different environmental areas, as has been done by CAMERAS who looked at monitoring requirements in 15 different environmental areas.</p> <p>LIABILITY – Scale of activity should determine levels of risk</p>	<p>Include the FSC in any work done on engaging volunteers.</p> <p>SNH to circulate the CAMERAS document.</p>

Data issues (Quality Control / Assurance)

Issue/Challenge	Solutions	Actions
<p>Data Suitability Quality depends on use of information:</p> <ul style="list-style-type: none"> - to build environmental stewardship - Answering questions <p>Are certain areas more suited to volunteer data collection?</p> <p>Methodologies, data validation & Verification</p>	<p>CONTEXTUALISATION – making sure volunteers know what the data is going to be used for & how it will be used, this will allow the right data assurance to be put into place.</p> <p>USING THE RIGHT VOLUNTEERS - Some collection requires highly skilled volunteers and some data can be collected ‘passively’ (e.g. air monitoring from a device, with GPS, added to a bike or in a pocket) where no skill are required. Need to match needs with the skills/technology available.</p> <p>TECHNOLOGY – measurements which require a level of expertise or mass collection could benefit from current technology or development / advances in technology e.g. species recognition applications on iphones.</p> <p>BEST PRACTICE - Provide best practice advice for data collection, metadata collection etc to reduce bias and increase chance of re-use.</p> <p>STANDRARDIZATION – of methods etc will help maintain consistency. Use of metadata will also help verify recorders and other useful information about the data e.g. SNH standard methods for species recording</p> <p>Provide error and confidence statistics with data.</p> <p>METADATA – providing metadata to accompany data increasing the validity and fitness for purpose of</p>	<p>SNH to send links/ details of their standard methods for species recording to the UK-EOF for reporting</p>

<p>How do you prevent misuse/ random data submission?</p> <p>Data ownership</p> <p>Continuity of long term observations - How can we ensure consistency of methods over time with changes in volunteers etc.</p> <p>International compatibility - data sharing and data access</p>	<p>data e.g. statements of methodologies or standards used whilst collecting data. Promotes data re-use if secondary uses can address it the data is fit for their purpose. The metadata must be available with the data on portals etc.</p> <p>TECHNOLOGY – new technologies could provide better analysis of data.</p> <p>DATA CLEANERS – some already available e.g. NBN record cleaner. These helps data managers screen large data sets for anomalies. Would need to develop other similar cleaners for other domains?</p> <p>Ownership should always belong to the data recorder. NBN have addressed issue of IPR.</p> <p>STANDRARDIZATION & BEST PRACTISE (see above)</p> <p>TECHNOLOGY – development of technology and applications to take measurements/ identify species etc could increase the reliability of data and therefore ensure continuity (if volunteers change but use same recording systems/ application then data should be consistent).</p> <p>REPRESENTATIVENESS of observations – use systems such as ITE land classification</p>	<p>NBN to send links to data cleaners and information about how these were developed to the UK-EOF for reporting</p> <p>NBN to send links to details of study carried out about IPR to the UK-EOF for reporting</p>
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Recruiting, Retaining, Managing Volunteers

Issue/Challenge	Solutions	Action
<p>How can we use existing volunteers? - Volunteer levels static & often drawn from same population group (double counting?)</p> <p>Managing volunteers Maintaining interest in ongoing/repeat surveys - Many volunteers' interests' peak with their learning curve – need to engage further and try and maintain interest or involve them in other projects.</p>	<p>ENGAGEMENT – Ensure volunteers are engaged from school age and onwards throughout the education system (up to university undergraduates) and via other community groups such as Scouts and Guides.</p> <p>Bottom up engagement – provide beginners with a 'journey' e.g. ispot – first time 'spotters' are referred to other information so they can find out more about what they spotted therefore maintaining the interest of the spotter and promoting how they can become more involved in recording etc. There need to be continued support after the initial engagement – for example BioBlitz are only held on a yearly basis and volunteers have requested that they happen more frequently.</p> <p>Organisations should engage with all types of volunteers – not all volunteers will be at the same level of understanding/interaction/expertise.</p> <p>Apprenticeships can be a positive way to engage volunteers and increase training to ensure they are fully engaged and the next generation of records is maintained e.g. BTCV</p> <p>UNDERSTANDING - Organisations need a better understanding of volunteer interests and motivations.</p> <p>KNOWLEDGE EXCHANGE (feedback and outputs) - Ensure rapid information flow and return of results to data providers in attractive form e.g. Atlases, NBN gateway (interactive, user friendly mapping for users to view their results).</p> <p>Include accreditations of volunteers in publications of</p>	<p>who?? to encourage organisations to promote surveys through schools etc.</p> <p>SNH to provide links to information about BTCV apprenticeships to the UK-EOF for reporting</p> <p>FC to send link to 'EU-wide monitoring methods and systems of surveillance for species and habitats of community interest' report to the UK-EOF for reporting</p> <p>UK-EOF to commission a piece of work to understand the motivation of 'environmental'/ natural science volunteers? and distribute to Management Group organisations (and others)</p>

<p>Need to ensure volunteers follow protocols/standards without being too restrictive or appearing bureaucratic.</p> <p>How can we make projects/opportunities accessible to volunteers?</p>	<p>results etc will show volunteers why they are collecting data and what it is used for.</p> <p>Mentoring (volunteers of volunteers) can help volunteers learn and engage more with activities.</p> <p>LEVEL OF MANAGEMENT – organisations need to be aware of different volunteer needs – instructions and recording sheets etc need to appeal and be useable for all volunteers.</p> <p>Organisations need to be aware of issue that may occur with paid staff and volunteers or new volunteers and existing volunteers etc.</p> <p>RESOURCES – e.g Darwin guide to recording wildlife published by NBN</p> <p>Media involvement is required for large scale public engagement</p> <p>Ensure ease of access to online data recording schemes.</p> <p>Create an online ‘one-stop shop’ of ongoing surveys for volunteers to access, including all types of activities e.g. passive/micro volunteering activities – would need to be accessible and usable for all types of volunteers (young, old, experienced/experts, beginners etc)</p> <p>Could this be a role for My environment? The Portal could include;</p> <ul style="list-style-type: none"> - access to data portals - access to ID guides, best practice methodologies etc - connections to volunteer networks (less face to face interaction now so need support online) 	<p>UK-EOF to create summary guidelines and report useful links to help organisations understand how to approach volunteer management (including motivations of volunteers, requirements for providing resources, feedback, level of management etc)</p>
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<p>How can we mobilise volunteers quickly in a narrow time window to provide near real time data?</p> <p>Geographical location/bias of volunteer distribution - how do areas with low populations recruit volunteers?</p>	<ul style="list-style-type: none"> - opportunities for volunteers to communicate about activities and experiences, support etc <p>MEDIA – use media where possible e.g. BBC to broadcast events and how citizen can get involved there and then (link to other websites with instructions etc).</p> <p>Engagement of ‘tourists’ in surveys (adventure holidays etc)</p> <p>Ensure stratification of results to control for bias</p>	<p>SNH to provide links to known example of tourist involvement in surveying etc.</p>
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Supporting Volunteers

Issue/Challenge	Solutions	Actions
<p>Volunteer Data is not free!</p> <ul style="list-style-type: none"> - Awareness - Training & materials - Infrastructure (e.g. data management) - Coordination - Insurance, Health and Safety 	<p>Volunteers need to be aware of the things being monitored before they can engage in the monitoring programmes.</p> <p>EDUCATION – Adding environmental monitoring to the Curriculum of secondary school children would raise awareness and may encourage the next generation of recorders. It may also help to address issues surrounding taxonomic skills needs (N.B. An LWEC report on SKILLS needs was produced in 2010).</p> <p>Volunteering activities could be incorporated into university courses, thus increasing awareness whilst also developing skills/training.</p> <p>TRAINING – The training given will depend on the tasks being carried out and also the age of the volunteer groups. Different training and materials will be needed for school children and adults groups.</p> <p>MATERIALS – Online materials are available – it is necessary to make it clear where these can be found e.g. through OPAL, i-spot (are developing Bayesian keys) etc. The Field Studies Council are leaders in producing ID guides and engaging with volunteers.</p> <p>MENTORS – Providing mentors to support volunteers and develop their skills. The Scotland apprentice scheme is an example of how mentoring can contribute to training. Mentoring can also be done remotely via the internet through online forums and the availability of guidance and identification keys.</p>	<p>Liaison with Department for Education [WHO?]</p>

<p>Does volunteer data provide best value for money?</p> <p>Squeezed resources</p> <ul style="list-style-type: none"> - View that volunteers are replacing staff 	<p>MEMBERSHIP - By being part of a group volunteers may feel like they have support should they need it.</p> <p>HEALTH AND SAFETY GUIDANCE – Guidance can be given (an example is that given to bat workers) to illustrate and raise awareness of the procedures.</p> <p>Online risk assessments can be made available along with information on legal responsibilities.</p> <p>NEW WAYS OF WORKING – Citizen Science may provide the opportunity to do things differently and could therefore open doors to using new methods of working. The provision of additional data etc may allow public organisations to prioritise staff and enable them to be deployed elsewhere.</p> <p>TIMESCALES – It takes time to engage with volunteers therefore any immediate urgent tasks would need to be carried out by staff. Volunteers could contribute to the less urgent collection of information in the long term.</p> <p>There is a need to look at what is required and determine the best options, considering the needs of both the organisation AND the volunteers, to fulfil this.</p>	
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