

UK- Environmental Observation Framework

Developing a Long Term Monitoring Network

December 2011

Workshop report

Executive Summary

The UK-EOF strives to change the way the UK perceives, values, archives and uses information from observation activities by working across public departments and agencies, the voluntary sector, industry and academia.

Organisations funding environmental observations are increasingly required to make efficiency savings and deliver better science. Bringing together the community is the first step towards investigating where opportunities might exist to create a more integrated monitoring suite for the UK. Identifying ways of increasing the effectiveness and efficiency of our long-term monitoring of the natural environment through better integration is the key aim of the UK-EOF's current work plan. The Natural England Long Term Monitoring Network is an example of where the UK-EOF can bring together members of the environmental monitoring community for a common purpose.

Twenty-seven delegates attended a collaborative workshop held at Charles Darwin House on the 9th December 2011. The aim of the workshop was to bring together members of the environmental monitoring community, across public and third sectors to engage in discussions about joining up monitoring networks and collaborative working. Delegates discussed Natural England's plans to develop a Long-term Monitoring Network and engaged in discussions about the barriers to and opportunities for sharing facilities, sites and data.

There was support for developing a more joined up monitoring network in the UK. Delegates expressed their interest in and shared their thoughts about the practicalities of a more joined up approach. They also provided examples and updates from their perspective.

The initial support for the Natural England Long Term Monitoring Network project from the wider community was good and delegates agreed that this may provide the basis by which new questions could be answered and many were keen to investigate if this could help secure the future of long term sites. Natural England agreed to continue communications and maintain links with the organisations throughout the development of the project.

The UK-EOF proposal to expand the scope of the Natural England Work to include other environmental domains and relevant organisations was supported as an appropriate longer-term plan.

Natural England and UK-EOF have agreed a number of actions following the workshop. Each delegate also took away actions for themselves or their organisation.

1. Background

- 1.1. Natural England has a project to develop, in partnership with a host of other organisations, a long-term network of sites to monitor the impacts of climate change, air pollution and land management on the natural environment. The workshop, hosted by the UK-EOF on behalf of Natural England, aimed to bring together key stakeholders in the environmental monitoring community to investigate the barriers to and benefits of more collaborative working such as sharing observation sites, facilitates and data.
- 1.2. The aim of the workshop was to provide the opportunity to discuss the integration of monitoring including collaboration on sites, infrastructure, data collection, management and sharing. UK-EOF, with its pivotal position in the observation community, was able to bring together a variety of organisations to do this and gain vital knowledge and scope ways to think about increasing the effectiveness and efficiency of the UK's long-term monitoring of the natural environment through better integration.

2. The role of the UK-EOF

- 2.1. Delegates (Annex A) were introduced to the UK-EOF and its role as a focal point for environmental monitoring in the UK. One of the main focuses of UK-EOF in 2012 will be to facilitate new ways of working collaboratively; the workshop was the first stage in exploring how organisations can work together in a more efficient and joined up way using the knowledge of where the monitoring is occurring.
- 2.2. The UK-EOF tools, including the Environmental Observation Activity Catalogue and the Statement of Need provide the evidence which allows us to identify gaps and potential duplications in the UK observation suite. The mapping tools considered at the workshop, using this evidence, allow us to focus on specific geographic areas where efficiencies could benefit the UK-EOF stakeholders and other non-government organisations.

3. Why should organisations work collaboratively?

- 3.1. Andy Nisbet, on behalf of Natural England, provided a background on the Long Term Monitoring Network project. The project is building on the work of the Environment Change Network (ECN) and proposals for an Environmental Change Biodiversity network (ECBN). The growing need to be able to provide evidence about the impacts of climate change, air pollution and land management on biodiversity means a long term monitoring network is vital. Building on and integrating with existing networks will help ensure the longevity and future security of long term monitoring sites.
- 3.2. A detailed explanation of the mapping work already undertaken to explore site coincidences was given by Helen Michell (Natural England). Examples of how this analysis could be used and potential impacts discussed. Representatives from public organisations shared with the group, how their organisations were already joining up networks or where the potential can already be seen from the Natural England analysis. Clear coincidences were seen with the Met Office and Environment Agency sites. The power of visualising the site locations and the flexibility of the analysis tool was seen as a great benefit to the project and further work.

- 3.3. Acknowledging there are many requirements for monitoring, the reasoning is to have a core network which could be drawn upon (and enhanced if necessary) to respond to and provide additional monitoring when required, e.g. ECN is now used to support Health Protection Agency's tick monitoring scheme. A Long Term Monitoring Network was also seen as an opportunity to improve emergency response.

4. Related programmes and other existing integrated initiatives

- 4.1. Lawrence Way highlighted some of the JNCC plans. Many objectives could be supported and would benefit from integrated monitoring across England and the rest of the UK. Using tools such as coincidence mapping would enable JNCC to see how which datasets could be used to relate to its own sites. From the coincident mapping it can be seen that there are JNCC sites in close proximity to Natural England's sites. Therefore JNCC are well placed as a potential collaborative partner. Working with others presents barriers as well as opportunities.
- 4.2. Richard Walmsley presented an overview of the Environment Agency's current monitoring network. Talks between Natural England and the Environment Agency, prior to the workshop have highlighted the potential which could be exploited. EA data is already used by many organisations, however there is potential to do more and share more with others, building on current relationships and expanding into new ones. The Environment Agency is keen to continue participating in such work which could be mutually beneficial to a variety of organisations.
- 4.3. Caryn Le Roux talked about the Welsh Natural Environment Framework, including new announcements to combine the Forestry Commission Wales, Environment Agency Wales, Countryside Council for Wales and the Welsh Biodiversity Partnership. Integration is at the heart of future plans in Wales to create more efficient and sustainable monitoring. This workshop was a good opportunity to enhance links to the rest of the UK.
- 4.4. In summary, there were several common issues faced by organisations and the potential for these to be addressed by collaborative working, involving projects such as the Natural England Long-term Monitoring Network, was acknowledged by all.

5. Plenary discussion

- 5.1. The workshop discussion was opened for delegates to raise questions about the Natural England long-term monitoring network and general points about collaborative working. Questions and responses are summarised below and actions agreed by delegates are presented in Section 7.
- 5.2. Delegates were keen to find out more about the long-term monitoring network plans, how sites will be selected and their relationship with the freshwater sites currently covered by ECN. The need to continue monitoring freshwater sites was stressed and the core data providers would need to continue with their sites, whether they were included in the Natural England long-term monitoring network plans or not. Water quality on land surface was also mentioned; the Environmental Agency's Water Framework Directive (WFD) sites were already included in the

initial mapping analysis and therefore could potentially be included in the LTMN sites.

- 5.3. What geographic area does a site represent? A 'buffer' zone rather than a single point was suggested as a way of representing the sites on the maps. It was however highlighted, that the key questions will need to be clarified before core sites can really be chosen.
- 5.4. The Met Office collects data from a series of sites over time which can be used to suggest the values for the surrounding area. The data are adjusted according the effects of topography and other variables. A final grid then provides the representative sample of the climate, gathered from fewer sampling points. Gridding data could therefore be useful
- 5.5. Involving the Devolved Administrations was seen as a clear benefit which needed to be considered. The UK-EOF works across the UK, but Natural England's remit does not. Representatives from Wales expressed their support and it was hoped to involve Scotland in future discussions.
- 5.6. The cost of establishing a long-term monitoring network could be high; however building on proposals and protocols from ECBN would help. However it was acknowledged that many of the voluntary organisations do not necessarily follow ECN or ECBN standard protocols and have their own/follow other recognised standards. Andy Nisbet agreed that this should be considered when looking at the finer detail of site parameters and recognised that the standardisation of methods may not be practical for all organisations.
- 5.7. Delegates were asked to consider if this type of site mapping analysis could work for other sets of parameters and a wider group of organisations. UK-EOF is interested in the questions that could be asked at the UK scale by increasing the number and type of sites included in the analysis. There was a general consensus that visualising where the sites are and then analysing in detail could be useful for all sorts of organisations/ strategies/ questions/ efficiencies.

6. Opportunities and barriers of a long term monitoring network

- 6.1. This section summarises feedback and actions from the breakout sessions which covered 4 areas where collaboration could be applied; in planning & sampling, in sharing facilities, in data collection and in data sharing. Full details of each of the breakout sessions are detailed in Annex B. Each group was asked
- What are the opportunities and barriers (of a long term monitoring network) for organisations?
 - How can the barriers be overcome?
- 6.2. In general a better understanding of what is going on and where would help organisations starting/ amending programmes get a better picture of the observation suite.

A - Programme and sampling strategies

At the planning stage there are opportunities to: share sites, methods, best practise, resources for implementation as well as ensure activities are undertaken in a way that is as efficient as possible.

Joint funding proposals could ensure programmes are carried out efficiently from initiation. Having joint funders could reduce the risk of a whole network being cut if there were future funding shortfalls. If requirements are known at the start there is often more chance that information relevant to policy / science / others could be integrated and collected at the same time.

Specifically for the LTM, sharing sites could provide better value for money across public sector organisations. It could also provide longer term security for monitoring networks and increase access to data for the stakeholders and public.

Once established as a joint network, there is an inherent inertia to change since decision making can be slow when there are many parties involved. This can be mitigated to some extent by having very clear goals and a vision that all sign up to. This relies on forming a joint understanding of each organisations requirements and operational limitations (such as funding cycles) from the start of any collaboration. The barriers to this are time and effort.

Collecting, possessing and storing additional samples/data could increase costs for some organisations, and would be a disadvantage to encouraging voluntary organisations to get involved.

There will never be a time when all monitoring occurs under the same network or is within the same plans and therefore parallel initiatives/networks would also have to continue.

B - Sharing facilities, equipment and services

Sharing facilities such as ships or laboratories could be advantageous and there seemed much scope to investigate further. Sharing back office functions, between NGOs for example, could be worth investigating. There was also thought to be scope in sharing vehicles or transport (for samples, equipment etc). This could reduce both the financial costs and the carbon footprint of monitoring. This would require a cultural change within organisations and effort to work out how this would be jointly funded etc.

There could be advantages for the people operating / working at the sites since being involved in a national scheme could be seen as more prestigious than a local scheme.

However the reverse is also true so care must be taken that joining up networks does not alienate the volunteers who collect much of the data.

The barriers identified were: different sampling methods increases the complexity of trying to collaborate; sharing labs and physical storage facilities may provide some cost savings, but could also mean transporting samples further for analysis or storage; having all samples in one place could be a risk and there could be difficulties making facilitates meet the needs of all types of samples.

In addition there are examples where landowners can be sensitive to having different government organisations on their land. This could mean that, even if more efficient, the land owners would not accept another organisation sent in to collect information. Further, sites could become overused, making landowners reluctant to agree to more sampling in the same place. There may also be issues with sensitive information e.g. Countryside Survey can not reveal the exact locations of the samples.

C - Sharing data collection

There is a potential for cost savings to be found by sharing data collection activities. This may be in the form of rationalisation of existing staff, retraining staff, encouraging involvement from existing volunteer networks in a new programmes or recruiting members to the public to become data collectors. Supporting existing networks of volunteers may help provide long term support to the data series.

The barriers identified include the cost of additional training (for existing staff or volunteers to collect additional data or use different methods/technologies) and the time taken to retrain. There is also a need to invest in motivating the volunteers (or staff) and provide feedback to encourage continued participation.

Not all samples can be effectively collected by non-expert staff or volunteers and the time and cost of laboratory analysis may rise. For example, insects may be identified in the field by experts, but volunteers may have to physically collect them to send to experts for identification. Therefore the insect is taken out of the field for identification, costing more money to transport and damaging the ecosystem.

The scale of the monitoring will affect the type of parameters which can be measured under a single network. Different sampling methods and standards employed by different organisations will have to be considered when attempting to share collectors. Many organisations will not want to change their methods as this may disrupt their long term record of data collection. Many other issues and barriers were explored during this session which will inform the UK-EOF citizen science project.¹

D - Sharing Data and Data Management

Sharing data is an obvious way of saving money and getting the best value from the investment (collect once use many times). However, the standards used and attributes collected by one programme may not necessarily meet the objectives of another. Streamlining standards used by different organisations could make more data more accessible. Applying QA to data would improve the confidence and usability. Creating accompanying metadata and ensuring standards and guidance are shared could help align these issues and make data more sharable. A big cultural change would be required to overcome some of these barriers. Organisations would have to sign up and agree to change their ways of working, and without a stimulus to do this, many voluntary organisations may be reluctant.

¹ For further information see http://www.ukeof.org.uk/co_citizen.aspx

Sharing information that has already been analysed could also save time and effort. Again, clear metadata would be required to enable users to ensure the analysis is fit for purpose. Data mining could be valuable and therefore increasing the awareness of existing analysed datasets which can be reused could be highly beneficial.

Mapping sites (such as the examples seen in the workshop) would provide users with a better understanding of the baselines to inform development of monitoring. Although not all site information can be shared, as seen in the workshop, there are significant numbers of sites which could be investigated for potential collaborations.

Sharing databases (and/or streamlining existing databases) could provide cost savings by reducing the cost of support and supplying data to numerous places. There are existing examples of good practice such as CEH ECN/ECBN from which lessons can be learnt. However there may be disadvantages if there is a loss of specialisation.

7. Recommendations and Actions

Natural England will:

- Clarify the LTMN project aims and objectives, explore the key questions to be addressed by further spatial analysis and identify review points for the LTMN project development.
- Review the range of the data points already used in the analysis and see what else could be ascertained from the data held.
- Review the existing methods and parameters measured and consider if these can be utilised or amended to fit plans.
- Continue communications with organisations represented and involve other potential key stakeholders such as SNH. Specifically;
 - Continue dialogue with Environment Agency on sharing facilities and identifying potential efficiency gain from more integrated data collection.
 - Continue dialogue with the Met Office on location of weather stations.
 - Discuss scope for collaborative working with Pond Conservation.
- Consider establishing a steering or advisory group of organisations actively contributing to the LTMN project.

In the context of its wider aims UK-EOF will:

- Consider hosting regular meetings or workshops to facilitate more integrated working at practitioner level. Such a group could have a general role to consider long term monitoring and act as a forum to discuss plans for related projects. It would need to have some link to the UK-EOF Management Group.
- Work with JNCC, to explore if current volunteer groups would be willing to participate in expanding the variables measured and whether they would have the capacity to fulfil extra demands on resources.(Note this is the Citizen Science project of UK-EOF)
- Follow up with individual organisations to determine whether the actions (tabled below) have been completed.
- Continue to support the Natural England LTMN project if required.
- Use the feedback from organisations to consider whether UK-EOF should expand the analysis to other environmental domains and organisations getting feedback where necessary.
- Assess the options for the UK-EOF catalogue to have a geographical information tool which would allow users to view where monitoring sites are.
- Review the outcomes of the CEH physical samples study and circulate outcomes to delegates.

- Encourage organisations to audit their own facilities (e.g. laboratories/ skills) as the first stage in collaborating with others (know what facilities are).
- Promote UK-EOF tools (catalogue, decision support tool etc) to allow organisations to view existing activities and networks.

Actions on all:

- Review lessons learnt from JNCC's stratification project.
- Increase the awareness of existing datasets which have already been analysed by experts but could be available for others (with/without restrictions) in multidisciplinary projects.
- Organisations to audit their own facilities (e.g. laboratories/ skills) as the first stage in collaborating with others (i.e. know what facilities you have and what they do)
- Include volunteer organisations, where appropriate, in network building discussions.

Organisations actions

Delegates agreed to take away actions for themselves and/or their organisations.

Organisation	Action
BBSRC	Use the analysis to look at where suction traps are positioned near other sites to inform internal decisions.
Botanical Society of the British Isles	Feedback key points and discussions from the workshop to colleagues.
BTO	Use the analysis to look at BTO sites. Support further work to look at the motivations of volunteers. Investigate if volunteers would be willing to measure other parameters; what would they find interesting?
Butterfly Conservation	Feedback the discussion from the workshop to colleagues at Butterfly Conservation.
CCW	Continue dialogue with CEH and others about joining up networks.
Dipterists Forum	Follow up conversations with Pond Conservation to investigate the potential of involving Dipterists Forum volunteers in the upcoming PC programme.
Environment Agency	Work with Natural England to explore opportunities for site collaboration
Freshwater Biological Association	Continue dialogue with EA and Natural England. Investigate the potential to audit lab facilities at FBA. Collate a list of monitoring and research activities involving volunteers.
JNCC	Build on tools and existing analysis with Natural England. Explore how the mixed layer sites could be used. Discussions with NGOs re: do existing volunteer networks have the capacity to fulfil future demand.
Met Office	Look at the requirements for GIS tools. Provide a paragraph about the lessons learnt from the Met Office volunteer programme for the UK-EOF newsletter. Share information about gridded climate data.
Natural England	Share analysis with delegates (check objections to sharing data first). Investigate the potential for grid analysis. Further define the scope and aims of the LTMN project. Continue to work with organisations represented at the workshop.
NERC CEH	Continue talks with Natural England and CCW about joining up networks. Continue working with JNCC and others. Feedback the discussion from the workshop to colleagues at CEH.
Non-natives species secretariat	Provide assistance following any recommendations to involve volunteers etc to the invasive species community (have good links with Scotland). Investigate the potential to involve non natives in existing monitoring

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	activities and with the Natural England LTMN.
Pond Conservation	Continue dialogue with Martin Drake and other NGOs in regards to the new PC volunteer programme.
RSPB	Provide better spatial data to Helen Michell for BTO sites. Liaise with BTO about the Breading Bird Survey.
UK-EOF	Send out the citizen science report to all delegates. Compile workshop report and distribute to delegates. Inform relevant delegates about the MBA citizen science workshop. Follow up recommendations and present options to the UK-EOF Management Group.
Welsh Government	Continue dialogue with CEH and others.

Annex A – Workshop agenda, delegate list and apologies

Developing a Long Term Monitoring Network Charles Darwin House, 12 Roger Street, WC1N 2JU 9th December 2011 (10.30-15.30)

Aims & Agenda

- To bring together organisations with an interest in collaborating with Natural England to develop a monitoring network to understand the drivers and impacts of long-term environmental change on biodiversity and ecosystems.
- To provide the opportunity to discuss the integration of monitoring including collaboration, sites, infrastructure, data collection, management and sharing.
- To identify ways of increasing the effectiveness and efficiency of our long-term monitoring of the natural environment through better integration.

10.15 Tea and Coffee available

1. **10.30 Welcome, Introductions and aims of the day** (Beth Greenaway)
2. **10.35 Natural England's Long Term Monitoring Network project - Aims & Benefits** (Andy Nisbet)
3. **10.50 Demonstration of coincidence mapping and examples of where efficiencies could be made** (Helen Michell)
4. **11.15 Potential benefits of greater integration?** (Andy Nisbet)
5. **11.30 The development of other related programmes and integration initiatives** (JNCC - Lawrence Way; EA - Richard Walmsley; Caryn Le Roux, WG) & open discussion (Beth Greenaway)

12.30 -13.15 lunch

6. **13.15 Breakout discussions** – What are the opportunities and barriers for your organisation? How can the barriers be overcome? (Beth Greenaway & Andy Nisbet)
 - A Programme and sampling strategies (common planning, project aims and site selection)
 - B Sharing Facilities, equipment and services
 - C Sharing Data Collection
 - D Sharing Data and Data Management

Tea & Coffee break

7. **14.30 Plenary** – feedback from breakout facilitators
8. **14.50 General discussion – making a collaborative long term monitoring network achievable** (Andy Nisbet)
9. **15.15 Summary & Next steps for NE and for UK-EOF** (Beth Greenaway)
10. **15.25 Wrap up** (Beth Greenaway)

Delegate	Organisation
David Allen	CCW
Jeremy Biggs	Pond Conservation
Olaf Booy	Non-natives secretariat
Tom Brereton	Butterfly Conservation
Corey Cannon	Pond Conservation
John Davy-Bowker	Freshwater Biological Association
Michael Dobson	Freshwater Biological Association
Martin Drake	Dipterist Forum
Mark Eaton	RSPB
Beth Greenaway	UK-EOF
Richard Harrington	BBSRC
Caryn Le Roux	Welsh Government
Dylan Lloyd	CCW
Helen Mitchell	Natural England
Don Monteith	NERC CEH
Andy Musgrove	BTO
Andy Nisbet	Natural England
David Noble	BTO
Gwyn Rees	NERC CEH
David Roy	NERC CEH
Andrea Sharpe	UK-EOF
Phil Trembath	NERC CEH
Jim Trice	Met Office
Amber Vater	UK-EOF
Kevin Walker	BSBI
Rich Walmsley	Environment Agency
Lawrence Way	JNCC

Apologies	Organisation
Sallie Bailey	Forestry Research
Bill Brierley	Environment Agency
Richard Fox	Butterfly Conservation
Zoe Frogbrook	Environment Agency Wales
Tony Gent	ARC Trust
Rebecca Insted	Forestry Commission
Helen Pontier	Defra
Keith Porter	Natural England
Des Thompson	Scottish Natural Heritage
James Skates	Welsh Government
Emma Small	Forestry Commission Wales
Mark Stevenson	Defra

Annex B – Feedback provided during the workshop breakout sessions

A - Programme and sampling strategies (Facilitated by Beth Greenaway)

Programme and sampling strategies	Opportunities and Barriers	Actions
Sharing sites	<p>Better value for public money.</p> <p>Longer term security of sites and monitoring activities.</p> <p>Increased data and access to data for stakeholders (and public).</p> <p>Better communication and awareness between organisations - Organisations involved know what is going on and where.</p> <p>Redirect local effort to be a part of a more robust and representative strategy.</p> <p><u>Build on existing networks when considering funding new observations, sites or networks.</u></p>	<p>Compatibility analysis – what can really be done?</p> <p>Promote discovery tools such as UK-EOF catalogue, Decision Framework etc so planners can consider existing networks or observations when looking to start new activities.</p>
	<p>Landowner's perceptions to different government agencies and departments.</p> <p>Parallel initiatives will continue to exist and compete in space and time.</p> <p>Long term programmes have embedded aims, methods and may be reluctant to change</p> <p><u>Additional costs to process data not necessarily required for organisations own needs.</u></p>	<p>Use non ministerial organisations to negotiate e.g. Wildlife Trusts, FBA etc.</p> <p>Clarify how sharing sites adds value.</p>
Joint planning for funding proposals	Joint planning and funding will ensure efficiency.	JNCC to pass on lessons learnt from stratification project.
Directly related to Natural England LTMN		
Planning and Site sharing	<p>Organisations involved know what is going on and where.</p> <p>A 'formal' network of long term surveillance for NE aims.</p> <p>Benefit local populations – experience for their CVs to be involved in a 'National Scheme'.</p> <p>To integrate information relevant to policy.</p> <p>EA could change 'where' sample fairly easily.</p> <p>Virtual observatory 'site' for weather observations can be generated from nearby sites.</p>	<p>Facilitate bilateral discussions with potential stakeholders.</p> <p>'Sell' idea to scientists and volunteers – 'National scheme' to encourage public engage and involvement in monitoring. Ensure volunteer organisations are represented on the steering group. Raise awareness in local communities.</p> <p>Make site locations available (GIS) = Met Office requirement.</p>
	<p>England only view.</p> <p>Long term programmes have embedded aims and reluctant to change – can add but not subtract or swap measurements etc e.g. Met Office, ECN.</p> <p>What questions are already being answered?</p> <p>Wide variety of organisations and disciplines involved – how do you understand the needs of everyone?</p> <p>Scale of sites required is too small for some animals e.g. birds.</p> <p>Not all locations can be used – issues with Countryside Survey etc.</p> <p><u>May instigate site 'overuse' – impact on landowner's willingness to allow access etc.</u></p>	<p>Wales to work towards this for Natural Environment Framework.</p> <p>Clarify aims of LTMN – long term change or long term sites?</p> <p>Is there a role for technology to help issue of existing programmes?</p> <p>Run them in parallel for now and think about longer term ways to bring them together.</p> <p>Discuss site sharing with stakeholders – facilitate dialogue/resources.</p> <p>Build in review points and encourage a flexible network.</p> <p>Bird organisations continue to support LTMN where appropriate.</p>

B - Sharing Facilities, equipment and services (Facilitated by Andrea Sharpe)

Facilities, equipment, services	Opportunities and Barriers	Actions
Share funding	Make less do more.	
	Organisational issues.	Culture change.
Sharing platforms e.g. ships		
Share sampling effort	Cost & efficiency savings	
	Different sampling methods will increase complexity of alignment.	Culture change.
Sharing laboratory facilities	Cost & efficiency savings.	FBA to <u>audit facilities</u> as a first step to investigating the potential to share facilities.
	Not all labs will have/need the same facilities	
Sharing storage facilities (physical samples)	Fewer storage facilities could save money.	Review outcomes of CEH physical samples scoping study in 2012.
	Increase transport to store samples in fewer facilities. Increased risk of storing large amount of samples in one place.	
Sharing vehicles to transport data collectors	Maintenance & fuel savings. Lower emissions = environmental benefits.	Culture change and discussions between organisations (e.g. how would it work? What are the mutual benefits; in kind contributions)
	Logistical issues: depends on when data collectors need to go to the sites.	Planning and logistics reviews into the sites were there is real potential for sharing.
Sharing staff inc. volunteers & skilled field staff	Long term cost savings.	
	Initial need for training of existing and new volunteers. Joint reporting on site	Need to ensure feedback is provided to volunteers to ensure they are encouraged and understand where the data goes. FBA, FSC, BSBI could potentially help train and share volunteers.
Share 'back office' functions (NGOs)	Save on running costs. Promote good communication between organisations and make it easier to other share volunteers, sites, facilities etc.	Investigate if this would be possible and if organisations would be willing to consider
	Physically moving organisations together may cause disruption and friction.	
Directly related to Natural England LTMN		
Joint codes of practise	Consistent methods and standards used across sites and organisations.	Engage with stakeholders
	How do you get organisations to join up to these? Not all orgs will want to change their existing methods etc.	

C - Sharing Data Collection (Facilitated by Amber Vater)

Sharing Data Collection	Opportunities and Barriers	Actions
Encouraging and sharing volunteers	<p>To motivate volunteers with targeted feedback.</p> <p>Use experts alongside paid staff to collect data.</p> <p>Build upon a strong network of trained volunteers and encourage new members of the public to get involved.</p> <p>Use technology to help collect more measurements (little or no training required).</p> <p>Public organisations could use volunteer data to support internally collected data e.g. EA water quality information could indicate pollution incidents which would cause a violation of WFD.</p> <p>Ensure the continuation of long term studies.</p>	<p>Build volunteer community into plans from the beginning using established network and sourcing new volunteers from other establishments such as universities.</p> <p>Investigate existing technologies and the quality of data produced – is this useful to those who could use the data?</p> <p>Guidelines for volunteers – e.g. how could your data help the EA?</p>
	<p>Likely to need some initial training (£) to ensure volunteer data collection standards are maintained.</p> <p>Lack of ownership – volunteers don't know why they collect data and how it is used.</p> <p>Volunteer fatigue – many volunteers may not wish to continue collecting the same data from the same place month after month/ year after year etc.</p> <p>Not all volunteers would want to collect other types of data.</p> <p>Volunteer organisations may not be able to change the method used to suit requirements of other projects.</p> <p>Experts can identify insects etc in the field, whereas volunteers may have to collect samples to send to an expert – issues with kill and collection vs. ID and release (especially with vulnerable species). May be technological solutions?</p> <p>Access to land may be an issue if volunteer organisations are now collecting data for public agencies. Not all landowners will be willing to continue providing access.</p>	<p>Ensure methods are standardised and training provided. Provide education as to why we need standards etc.</p> <p>Establish a coordination role to provide feedback to volunteers (helps motivate).</p> <p>Survey volunteers to investigate their willingness to collect other measurements alongside the normal data they collect.</p> <p>Ensure protocols of volunteer organisations are reviewed and volunteer organisations are involved in the steering group discussion for projects looking at using volunteers.</p> <p>Address access issues.</p>
Sharing staff	<p>Cost of sending two people to the same site (or nearby sites) reduced.</p>	Compatibility analysis required for detailed review of if sharing staff could be achieved.
	<p>Timing of sampling may not coincide e.g. different measurements need to be taken at the same location but at different times of the year, night or day etc.</p>	
Sharing common methods	<p>ECN methods (for example) would limit the use of volunteers in collecting data for the LTMN.</p>	Review existing methods in planning stages.

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Rationalisation of (paid) staff	<p>Use existing staff to gather data – widens interest in job specifications and encourages staff to be hands on. People analysing/storing/modelling the data understand where it's come from.</p> <p>Non-expert staff will require training (£) to ensure they have the knowledge to collect parameters required. May not be cost efficient.</p> <p>There may be others who can do that job better but are more expensive to employ.</p>	Provide training to staff including why standards are important and methods need to be enforced.
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D - Sharing Data and Data Management (Facilitated by Helen Michell)

Sharing data and data management	Opportunities and Barriers	Actions
Sharing existing technologies/databases e.g. Data.gov	Cost saving to organisations thinking of starting up new databases/ developing their own technologies	Take lessons from existing databases/technologies e.g. CEH ECN/ECBN; RSPB Merlin. Requires agreements for sharing and storing between those involved. Review existing database and technologies. Develop feedback mechanisms to understand the pros and cons of existing database etc.
	Who funds what? Many systems available – which is the best? No common model to all organisations. Technologies developing fast – what is suitable now may not be in several years time.	Discuss funding mechanisms or in kind contributions between stakeholders.
Streamline existing number of databases	Make it easier to store, find and reuse suitable data.	Create common principles for data capture, verification etc Can learn from NBN? Common data sharing agreement.
	Loss of specialised databases. Technologies developing fast – what is suitable now may not be in several years time.	Review existing database and technologies.
Standardised attributes (collected) and recorded	Common QA = increased confidence in data. INSPIRE – not compulsory for volunteer organisations.	Clear metadata required (contextual). Guidance and standards (minimum requirements). Work with volunteer organisations to encourage them to use required standards. This will help others be able to use the data and encourage volunteer networks to contribute to the 'bigger picture'.
	Many organisations already have their own standards etc and may not be willing to change procedures already embedded.	Culture change and organisational changes will be required.
Overarching data sharing agreement	Ensures standards are maintained and increases likelihood of data reuse.	
	Complex variables to capture. Already a variety of existing standards – how can we streamline?	
Centralised data storage location	Easier to share – data more openly available including for MSc and PhD students. Increased transparency. More obvious to data collectors where their data goes and how it is being used. Allows data mining. Access to combined baseline data for modelling.	Requires a data usage agreement e.g. analysis with commercial applications. Combine/integrate datasets to allow for data mining.

Developing a Long Term Monitoring Network - Workshop report

	<p>Transferring existing data and costs of building new/ upgrading existing. Risk of everything held in one place. Funding mechanisms. Data ownership issues.</p>	<p>Development of feedback mechanisms for data collectors/landowners etc. Guidelines for using data for modelling purposes – what are the limitations?</p>
Sharing mapping, planning, land management data	Better understanding of baselines to inform development of monitoring.	<p>QA flag – fast track data for access with/without official verification?</p>
	Not all site information can be shared.	
Sharing useful/derived analysis datasets	<p>Cost saving for data collection, processing, logistics, storage etc Increase data mining – what already exists which can be reused?</p>	Increase awareness of existing analysis datasets which can be reused (with or without restrictions).
	<p>Is the data suitable for reuse? Data flow is slow.</p>	Improve time required to make data available – simple online data up loaders etc.
	Volunteer buy-in to comply.	