

Appendix SM2: Survey and Monitoring Supplementary Methodology

Section 1: Introduction	1	3.3 Structured surveys	3
Section 2: Selecting a survey and monitoring approach.....	1	Section 4: Selecting a survey design	3
Section 3: Description of data recording terminology used in this report.....	2	4.1 To address baseline gaps.....	3
3.1 Unstructured recording.....	2	4.2 Measuring Success.....	4
3.2 Semi-structured and effort recording ...	2	4.3 Monitoring Change	6
		4.4 Selecting a sampling approach	6

Section 1: Introduction

1. This appendix offers a summary of relevant survey and monitoring approaches for biodiversity assessment and conservation. It covers the benefits of standardised methodologies, highlights the importance of clear objectives and volunteer participation, and explores a range of possible survey types, from unstructured to structured.

Section 2: Selecting a survey and monitoring approach

2. There are significant benefits of using established, standardised monitoring methodologies, often associated with national recording schemes ([Bane & Pocock 2023](#)):
 - Methods have been tried and tested.
 - Recording resources already exist.
 - Collected data is comparable to and compatible with data that has used the same methodology.
 - Tools for submitting and storing data are simple to use and efficient.
 - Data is validated and verified, ensuring quality assurance.
3. Factors to ensure a successful survey design (based on [Pocock et al, 2014](#), [Roy et al, 2012](#), and [Bane & Pocock, 2023](#)) include:
 - The aim/questions are clear.
 - Engagement is a high priority.
 - The motivations and expectations of volunteers have been identified.
 - Projects are tailored to match the interests and skill sets of participants.

- Survey design is well planned, ideally using co-design methods.
- Sufficient resources are available for the project throughout its duration.
- The protocol required for data collection is not too complex.
- Volunteers' time and effort is appreciated, with activities kept as short as possible.
- It is considered important to keep volunteers updated.

Section 3: Description of data recording terminology used in this report

3.1 Unstructured recording

4. Unstructured recording is ad-hoc, casual observation, often made by volunteers at their convenience. Volunteers record data at their own discretion, noting species name, location, and sighting date, possibly including individual counts.
5. An example is noting wildlife seen when visiting the park. Many recording schemes accept these records, providing the basis for understanding many taxa in the UK. Additionally, unstructured records are for documenting unusual occurrences, such as nocturnal species and species outside of their normal geographic range for the time of year.
6. The benefits of unstructured recording are that data is simple and easy to collect, resulting in large datasets.
7. The challenges of unstructured recording are that it lacks standard methodology and can suffer from recorder bias.
8. Unstructured surveys have not been included in SMF Appendix SM1 BBS - Survey and Monitoring List, due to the difficulty in linking these to local reporting targets. However, these can still be useful for encouraging engagement with recording and biodiversity and can contribute to national datasets and species trends.

3.2 Semi-structured and effort recording

9. Semi-structured and effort-based recording is a middle ground between unstructured and structured surveys.
10. Many organised citizen science programmes facilitate public participation in wildlife monitoring, where volunteers follow standardised protocols that allow for quantitative analysis of population trends. For example:
 - Systematic surveys run by the British Trust for Ornithology (BTO) such as [Breeding Bird Surveys](#)
 - [Beewalk](#)
 - [Garden Birdwatch](#)
 - [PTES Living with Mammals schemes](#)
11. Engaging the same volunteers in repeat sampling of designated sites and species provides consistency for comparing results over time. To maintain data quality, expert validation of species identification and robust training resources for volunteers are essential.

12. Supporting and enhancing the skills of a dedicated group of volunteers enables consistent monitoring across a range of taxa and a network of reference sites (e.g., the ['Wildlife Recorders of Tomorrow'](#) scheme). Experienced volunteers can then pass on knowledge, building a support network to assist others with identification.
13. Promoting the use of citizen science apps like [iNaturalist](#) and [iRecord](#) provides wider spatial coverage for recording range shifts or identifying new colonisation sites.
14. The use of technology allows unskilled volunteers to get involved effectively in wildlife recording that would otherwise be the preserve of skilled volunteers or experts. For instance, in the [Norfolk Bat Project](#), volunteers used a static bat detector to record bat calls over three nights at three separate locations within a 1km grid square. These recordings were then analysed by the BTO to generate a list of bat species recorded at each location.
15. Where semi-structured surveys can contribute to survey and monitoring efforts these are identified in SMF Appendix SM1 BBS - Survey and Monitoring List.

3.3 Structured surveys

16. Structured surveys involve following a set survey protocol and design. Specific sites are often chosen and revised within defined time periods.
17. The benefits of structured recording are that it serves a defined purpose and offers more representative and comparable data that is easier to analyse. It records abundance as well as presence over time.
18. The challenges of structured recording are that it requires adherence to a protocol, time and travel commitments and a commitment from organisers to run the design and delivery.
19. Where structured surveys can contribute to survey and monitoring efforts these are identified in SMF Appendix SM1 BBS - Survey and Monitoring List.

Section 4: Selecting a survey design

20. Selecting the right survey design is essential to accurately assess and manage biodiversity. This involves various methods, each with a unique role: inventories catalogue habitats and species, species distribution atlases map species patterns, and accuracy assessments validate existing data. The 'Before-after-control-intervention' (BACI) approach is particularly effective for evaluating conservation impacts. Additionally, pilot sites test the feasibility of conservation strategies. These methods collectively ensure effective monitoring and preservation of ecological diversity. This section outlines which survey designs can be used to provide the right type of data for the questions being asked.

4.1 To address baseline gaps

21. To effectively address baseline gaps, it is important to determine the nature of the data gap. Creating detailed inventories and species distribution atlases provides a comprehensive understanding of existing biodiversity, while accuracy assessments help in validating and refining this baseline data. These approaches are critical in

identifying and where possible addressing knowledge gaps, ensuring a robust starting point from which conservation efforts can be determined and measured.

4.1.1 Creating Inventories

22. An inventory is a list of habitats and species occurrences in a given area, that are typically undertaken when this knowledge is lacking. Inventories are a useful assessment tool, that determine the distribution and composition of species and habitats biodiversity and provide a resource for managing resources. Inventories collate existing information from existing data, literature reviews and may require some specific surveys to address gap.

4.1.2 Species distribution atlases

23. Recording species distribution within all tetrads (2 km x 2 km square) or hectads (10km x 10km square) in the study area, provides a comprehensive understanding of the species distribution within the study area, which is not influenced by recorder effort. Atlas assessments are time consuming and will not be possible for all species or species groups. National distribution atlases for species or species groups are compiled periodically. Local data can be used to support this work, and these national initiatives often provide an impetus for recording effort during this time. National atlases project can also provide guidance on appropriate methodologies for specific groups and other relevant support.

4.1.3 Accuracy assessments

24. Selecting sites to assess the validity of existing habitat or species data is a useful way of assessing the robustness of the baseline and directing future actions to resolve any issues found. It is likely that the sites selected will be focused on areas of uncertainty in existing data but should be randomly chosen within assessment areas.

4.2 Measuring Success

25. Measuring the success of conservation efforts requires carefully chosen methodologies that accurately reflect the impact of interventions. The 'Before-after' and 'Control-intervention' methods, along with the comprehensive 'Before-after-control-intervention' (BACI) approach, are critical for assessing the effectiveness of conservation actions. These techniques offer insights into the changes brought about by conservation strategies, guiding future actions and policy decisions.

4.2.1 'Before-after' methods

Where conservation actions take place on one or more sites, monitoring should take place before and after the actions to assess their impact. A summary of the main 'Before-after' design methods and their strengths and weaknesses are detailed below ([Bane & Pocock 2023](#)).

4.2.1.1 Before-after

Using this method, sites are monitored before and after any conservation actions to assess the impact.

- Some years are good for species whilst others are not so it may take several years for any effects to become clear.
- Needs to consider how species/habitats are changing elsewhere; perhaps populations would have changed anyway.
- Requires planning. Monitoring should run for at least 2 years prior to conservation actions.

4.2.1.2 *Control-intervention and Space-for-time*

Using this method, similar sites are monitored to show the change/progress. Funding for actions often means monitoring cannot take place before the action so monitoring takes place once the action has been completed and compared with a site where no action has taken place (a 'space for time' design).

- Useful for when there is funding for conservation actions and their impact needs to be measured.
- Requires suitable 'control sites' to be found and monitored. These need to be similar to sites where the actions are taking place.

4.2.1.3 *Before-after-control-intervention (BACI)*

This method combines the 'before-after' and 'control-intervention' methods.

- This is the gold-standard scientific approach for assessing the impacts of actions.
- Monitoring is conducted before and after on the site where the action takes place, and monitoring is also carried out on a control site where no action has been taken.
- Variables like the weather and the site can be considered in the results.
- Requires good planning, with monitoring conducted at least 2 years prior to any action taken.
- Monitoring many sites repeatedly can require a lot of resources.

26. Based on the above summary, scientific evidence indicates that the 'Before-after-control-intervention (BACI)' approach is the most beneficial. This framework therefore strongly recommends that the BACI approach is followed where possible for measuring the success of conservation activities via pilot sites. However, it is acknowledged that it may not always be possible to implement this approach, particularly if appropriate control sites or volunteer resources are insufficient.

4.2.2 *Using pilot sites to assess conservation outcomes*

27. Before rolling out full-scale conservation actions, pilot studies can be used to evaluate feasibility in terms of cost, required expertise, number of samples required, and data quality. The results of these pilot studies can help refine methodologies. The locations chosen for pilot sites should have representative features or consistent areas of habitat. Pilot sites should avoid ecotones or edges of habitat, unless this is the variable being measured.

4.3 Monitoring Change

28. The different approaches and their significance monitoring change in ecological conservation are summarised below.

4.3.1 Species surveillance

29. Species surveillance uses standardised, repeatable methods to record species across a network of sample sites. Survey methods can range from active field surveys to more passive techniques such as trail camera and acoustic monitoring.
30. Repeated visits to these sites, consistently using the same methods allows species change over time to be determined. Species surveillance projects can survey a single taxon group, or they can involve surveying for multiple taxon groups on each site, maximising efficiency.
31. A good example is that of churchyards. These are excellent sites for species surveillance projects. Not only do they contain important remnant habitats and many different species groups, but they are also a good size for repeated surveys and public access is generally permitted.

4.3.2 Fixed point monitoring

32. Taking a series of photographs from the same location over time provides a record of changes that have occurred. This is a good approach where visual assessment is possible such as changes in land use or vegetation structure. Other factors, such as changes in weather and climate may be possible to detect over longer-timescales.

4.3.3 Aerial and satellite photography

33. Remote sensing data is commonly used by field ecologists to map habitats and is a useful tool at large scale. Regularly updating this data allows comparison of changes over time. The Norfolk Habitat Map (not yet publicly available) has been designed to make this type of assessment possible.

4.4 Selecting a sampling approach

34. Further information on options for selecting a sampling approach are listed below:

- The BTO's suggested sampling strategy for volunteers validating Living Maps ([Newson et al., 2016](#)). could be considered in deciding on the network of sample sites and locations for stratified surveys.
- The [DECIDE \(Delivering Enhanced Biodiversity Information with Adaptive Citizen Science and Intelligent Digital Engagements\) Project](#) is being run by the Centre for Ecology and Hydrology (CEH). It aims to create a tool to help recorders identify places where species records of various taxonomic groups are most needed. This may help with the sampling strategy for gap filling and especially for species specific surveys. The project is still in its early stages, and is initially focusing on butterflies, moths and grasshoppers.

Appendix SM3: Resources and guidance for conducting wildlife surveys

Contents

1. Introduction	2
2. Considerations for undertaking survey and monitoring	2
2.1. Funding.....	2
2.2. Appropriately skilled biodiversity surveyors.....	2
2.3. Provision of appropriate training	5
2.4. Provision of the correct equipment	5
2.5 Health and safety	5
2.6. Access to sites	6
2.7. Learning from others	6
3. Resources to support wildlife recording...6	
3.1. CIEEM guidance for conducting professional wildlife surveys.....	6
3.2. Resources for setting up wildlife surveys.	7
4. How biological records are managed	10
4.1. How to submit records	10
4.2. Support with species identification ..	11
4.3. How biological records are managed by NBIS.....	11

1. Introduction

1. This appendix compiles resources and guidance for conducting wildlife surveys, from considering the funding, skills, equipment and permissions required before recording takes place, through to how the resultant records are managed and shared. Designed to be used alongside the Survey and Monitoring Framework, this appendix will assist in developing an action plan to take forward recommendations from that report.

2. Considerations for undertaking survey and monitoring

2.1. Funding

2. Financial resourcing is a crucial requirement of any long-term programme. It is an important consideration of feasibility assessments, and in development of the Survey and Monitoring Programme. Investment is needed to plan, manage and deliver a Survey and Monitoring Programme. Allocating staff resource, and providing volunteers with the right training and equipment is also important. The benefits to people and biodiversity are significant, and it provides a long-term evidence-based way to measure success and monitor change. [Blaney et al \(2016\)](#) provide a free tool for decision makers, to assess the costs and benefits of implementing a citizen science and environmental monitoring programme. This includes evaluating direct and indirect financial and non-monetary factors.

2.2. Appropriately skilled biodiversity surveyors

3. Whilst some biodiversity surveys can be carried out by volunteers; others will need to be professional surveys conducted by experts. This section explains how to utilise different skill levels and balance these against financial costs and timescales.
4. Determining when to engage paid ecologists versus skilled or expert volunteers, or even unskilled volunteers, can be challenging. However, there are now resources available to assess the suitability of different surveyors for specific tasks. It is crucial to get to know surveyors or rely on experts who can evaluate their skill levels and knowledge. To understand the potential of each type of surveyor, and the complexity involved, consider the examples below:

- [BTO surveys](#) with information on time and skill levels recommended for participation.
- Pollinator survey and monitoring schemes, and their appropriateness for different situations and surveyors: [Bane and Pocock 2023](#), p20-25.
- The [Field Identification Skills Certificate \(FISC\)](#), which is a Botanical Society of Britain and Ireland (BSBI) test that assesses the proficiency of an individual on a scale from 1 (beginner) to 5 (professional), with a level 6 awarded in exceptional cases. It is becoming the gold standard for professional ecologists and volunteer surveyors alike in plant identification field skills.
- [Pocock et al, 2014](#), who provide a decision framework that is useful in guiding whether and when to use a citizen science (volunteer) approach for environmental monitoring, versus a paid survey by a professional ecologist.

Professional ecologists

5. Professional paid surveys might be required:
 - Where species are more obscure or difficult to identify (e.g. aquatic molluscs).
 - Where complex survey methods are required.
 - Where specialist equipment is required.
 - For surveys of protected species (e.g. great crested newts (GCN) or bat roosts) which require a license. These must be carried out by appropriately qualified surveyors such as ecological consultants, following approved protocols, and taking care to minimize habitat damage. However, initial piloting of Protected Species volunteer programmes by Norfolk Wildlife Trust and NBIS have shown that, by initially involving professional experts as mentors, it is possible to train existing skilled volunteers to gain the required licences.

Volunteers

6. Encouraging volunteers to get involved in recording and surveying their local wildlife is a great way to engage them with biodiversity, which has been shown to have a positive impact on people's health and wellbeing. Noticing nature also makes people more likely to want to look after it, leading to positive improvements in the environment. Methods of monitoring this increased engagement are outside the scope of this project but such monitoring is strongly recommended. This could include, for example, monitoring the number of records submitted for key urban species or the number of residences engaged with wildlife friendly gardening.
7. Volunteer experience varies immensely, from 'keen but unskilled' through to the [County Recorders](#), who are experts in their specialist taxonomic groups. Records from volunteers are most likely to be ad hoc, although with some training in survey methods, more structured surveys, surveillance and even monitoring by volunteers can be achieved.

8. Volunteer motivation is key. Providing the right support, training, mentoring, equipment, travel costs and clearly explaining the importance of what they are contributing are all factors in this motivation. The amount of time a volunteer will have may vary considerably, and so tailoring surveys to their availability will positively impact on their motivation and willingness to participate.

Developing a Local Groups Programme

9. Due to costs and time, it is much more effective to undertake most surveys and monitoring with volunteers rather than professionals, and to engage with existing volunteers. The efforts of multiple volunteers across multiple groups can create a far larger resource than is possible with paid professionals. Large recruitment drives for new volunteers may be useful for engagement but require much more time to manage, train and motivate. Instead, 'Friends of' groups should be used for specific sites, and The Conservation Volunteers (TCV), Norwich Fringe, and Mousehold Heath volunteers for a wider suite of sites. Additional roving groups such as the Norfolk Flora Group, have also offered, through stakeholder engagement, to help survey and monitor sites in the city. Existing volunteers are already motivated, knowledgeable and skilled. It is recommended that support and facilitation is provided to develop a 'Local Groups' Programme' to exchange skills, knowledge, equipment and expertise. Some of which could be facilitated through [Lumi](#).
10. An exchange of ideas and learning between volunteer groups regarding recording and monitoring is vital to mobilise and coordinate enough volunteers for an effective survey and monitoring programme. This could initially be an organised event (or series of events) at a site(s) where groups demonstrate surveys and monitoring they are already undertaking. Through this mutual exchange of skills, knowledge and resources, most groups will be able to survey 'the basics' after a few years.

2.3. Provision of appropriate training

11. Volunteers who are beginners or improvers, either for recording in general or of a specific taxon group, will need appropriate training to ensure that survey methodologies are correctly followed, and species are correctly identified. [County Recorders](#) are the local experts for each taxonomic group and could be approached to provide bespoke training for a specific survey. When delivering national survey methodology, [national schemes](#) may be able to provide training for volunteers and other benefits such as access to equipment, resources or even funding, but this would depend on individual societies. Existing volunteers who are already motivated, knowledgeable, and skilled can also be used to develop and expand a recording network. Such peer-to-peer learning is a very valuable way of recruiting and training volunteers and reduces the pressure on experts' time. Informal recording groups and networks are a good way of facilitating this, and giving volunteers roles in the network helps to utilise skills and significantly increase group outputs.

2.4. Provision of the correct equipment

12. Equipment for conducting biological recording can be expensive, and it is worth exploring potential sources of funding and who is best placed to look after the equipment in the long term. Specialist equipment is often needed for specialist surveys, but these are most likely to be carried out by professional ecologists or specialist groups who already have equipment. Equipment provision would therefore be included in any charges for service. For surveys that are likely to be undertaken by volunteers, equipment hire and pooling of resources between volunteer groups is recommended. Surveys designed for volunteers, such as many of the national schemes recommended in the Survey and Monitoring Framework, have been designed to be low cost. Where equipment is needed, details are available with the survey guidance.

2.5 Health and safety

13. Before any survey and monitoring work is carried out, a health and safety assessment should be undertaken and risk assessment procedures followed, both for group events and lone working. Public liability insurance may be required for group events.

2.6. Access to sites

14. Permission should always be sought from the landowner and/or manager before any surveys take place. In the case of SSSI sites there will be an officer responsible for the site at Natural England who must also be informed. If possible, permission should be given in writing so it can be produced on site if anyone challenges the surveyor about their presence. Any access issues, including parking, seasonal restrictions or hazards should be confirmed with the landowner/manager prior to surveying taking place. Sites may have livestock present. Contact with the landowner prior to survey should inform you of any sites where this is the case.

2.7. Learning from others

15. Similar projects to develop long-term monitoring strategies to monitor change and measure success, such as the work currently being undertaken at Wendling Beck, offer good opportunities for knowledge exchange and learning from others. Development of best practice guides both locally and nationally, in coming years, will allow further refinement of the suggestions made. The same will be true for guidance and monitoring programmes that may be developed through the LNRS process.

3. Resources to support wildlife recording

3.1. CIEEM guidance for conducting professional wildlife surveys.

16. These set the criteria for the knowledge, skills and experience required by ecologists undertaking a range of species survey work in a professional capacity. The Guidance currently covers a range of terrestrial and freshwater species. An [overview of the guidance](#) is also available. These resources are available at <https://cieem.net/resource/competencies-for-species-survey-css/>

Species	Species Guidance Link
Badgers	CSS-BADGER-April-2013.pdf (cieem.net)
Barn owls	CSS-BARN-OWL-April-2013.pdf (cieem.net)
Bats	CSS-BATS-April-2013.pdf (cieem.net) The Norfolk Bat Survey methodology assigns surveyors to a 1km square, with the most valuable information obtained when a square is surveyed by a volunteer over several years.

Species	Species Guidance Link
	Churches can often be effective sites for collecting long-term roosting data (see the Bats in Churches project).
Eurasian Otters	CSS-EURASIAN-OTTER-April-2013.pdf (cieem.net)
Great Crested Newt	CSS-GREAT-CRESTED-NEWT-April-2013.pdf (cieem.net)
Hedgehog	CSS-HEDGEHOG-April-2013.pdf (cieem.net)
Natterjack Toad	CSS-NATTERJACK-TOAD-April-2013.pdf (cieem.net)
Other Amphibians	Other amphibians like common toad, common frog, and smooth newt can be monitored through visual encounter surveys, netting, and acoustic surveys. Egg mass counts for common frog and toad are also useful.
Polecat	CSS-POLECAT-April-2013.pdf (cieem.net)
Reptiles	CSS-REPTILES-October-2014.pdf (cieem.net)
Shrews	CSS-SHREWS-April-2013.pdf (cieem.net)
Water voles	CSS-WATER-VOLE-April-2013.pdf (cieem.net)
White Clawed - crayfish	CSS-WHITE-CLAWED-CRAYFISH-April-2013.pdf (cieem.net)
General note on Invertebrate sampling techniques	Sampling utilises methods like sweep netting, pan traps, pitfall traps, Malaise traps, and direct searching to capture specimens for identification. Lethal sampling requires an A29 license from Natural England. Non-lethal observation surveys can be conducted without a license, but handling of species like bumblebees would need appropriate licenses. Insect survey experience is needed to ensure proper protocols are followed to minimise habitat disturbance. A certain level of expertise to accurately identify species, often requiring input from County Recorders to identify unknown taxa.

3.2. Resources for setting up wildlife surveys.

17. Examples of citizen science surveys being run for garden wildlife include:

- [The Wildlife Trusts - Wildlife Gardening Survey](#)
- [BSBI - Garden Wildflower Hunt](#)
- [The RSPB - Big Garden Birdwatch](#)
- [Natural History Museum - City Nature Challenge 2023](#)

18. Key resources from the Natural History Museum (NHM) are linked below:

- [Introduction to biological recording](#)

- [Getting started with wildlife monitoring](https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/pond-surveys.html)
- [Survey calendar](https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/survey-calendar.html)
- [Monitoring community greenspace](https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/community-greenspace-surveys.html)
- [Street and parks surveys](https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/street-and-park-surveys.html)

NHM Nature Recording Hub resources	Link
Pond wildlife surveys	https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/pond-surveys.html
Pond wildlife surveys	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/pond-surveys-sheet.pdf
Plant and pollinator surveys	https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/plant-and-pollinator-surveys.html
Plant and pollinator surveys	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/plants-and-pollinators-surveys-sheet.pdf
Community greenspace	https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/community-greenspace-surveys.html
	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/community-greenspace-surveys-sheet.pdf
Street and parks surveys	https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/street-and-park-surveys.html
	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/street-and-park-surveys-sheet.pdf
Survey calendar	https://www.nhm.ac.uk/take-part/monitor-and-encourage-nature/getting-started-with-wildlife-monitoring/survey-calendar.html
Bird survey methods and ID guides list	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/bird-survey-methods-and-id-guides-sheet.pdf
Mammal survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/mammal-survey-methods-and-id-guides-sheet.pdf

NHM Nature Recording Hub resources	Link
Terrestrial invertebrate survey methods and ID guides - Beginners' catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/terrestrial-invertebrates-beginners-survey-methods-and-ID-guides-sheet.pdf
Freshwater invertebrate survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/freshwater-invertebrates-survey-methods-and-id-guides-sheet.pdf
Reptile survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/reptile-survey-methods-and-id-guides-sheet.pdf
Amphibian survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/amphibian-survey-methods-and-id-guides-sheet.pdf
Plant survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/plant-survey-methods-and-id-guides-sheet.pdf
Fungi, lichen and bryophyte survey methods and ID guides list	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/fungi-lichen-and-bryophyte-survey-methods-and-id-guides-sheet.pdf
Habitat classification survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/habitat-classification-survey-methods-and-id-guides-sheet.pdf
Tree and hedgerow survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/tree-and-hedgerow-survey-methods-and-id-guides-sheet.pdf
Survey methods and ID guides for invasive non-native species, pests and diseases	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/invasive-species-survey-methods-and-id-guides-sheet.pdf
Soil and soil fauna survey methods and ID guides catalogue	https://www.nhm.ac.uk/content/dam/nhmwww/take-part/monitor-and-encourage-nature/nature-recording-hub/soil-and-soil-fauna-methods-and-guides-sheet.pdf

- Many of the standardised surveys will already have a website or app where you can upload your results. If you make observations outside of these surveys, using the ID guides or your own methods, you can use apps like [iRecord](#) or [iNaturalist](#) to share your records.

4. How biological records are managed

4.1. How to submit records

Submitting directly to NBIS

19. NBIS is happy to receive records, both from professional surveying and ad hoc recording, directly via email to nbis@norfolk.gov.uk. Records will be added to the NBIS database and sent for verification before being made available.

Records from national surveys

20. Records have more value when shared with others. For this reason, it is important to contribute to national recording schemes where possible, and to submit records through each scheme's recommended reporting method. Ideally the records could then be obtained back from those schemes to report locally. Unfortunately, this is often not the case ([Bane and Pocock, 2023](#), p32), due to technical and capacity issues (many national recording schemes are run by volunteers), although it is currently being explored by many of the schemes recommended. This issue should not be a deterrent from using national scheme methods or submitting records directly to them, as the benefits considerable outweigh the limitations. To deal with this issue it is recommended that NBIS leads on the coordination of records data flow and works towards making all submitted data available to Norwich CC, as part of its core records centre work. It is also recommended that all records created from the survey and monitoring undertaken through this framework are collated and submitted to NBIS, as well national schemes. This allows NBIS to provide the correct data back for local reporting in a timely manner, until functionality becomes available for all national schemes to provide their volunteers with local extracts of the data. A costed Service Level Agreement (SLA) would be an option between NBIS and Norwich CC for data work over and above NBIS's core work, or that which is reasonably uncharged, as part of a coordinated approach going forward.

Records from ad hoc recording online

21. The use of [iRecord](#) is recommended to collect and manage biological records created as part of ad hoc surveys and citizen science recording. Activities can be set up by survey organisers. Records can then be added by recorders. This could be a bioblitz (an event focussing on finding and identifying as many species as possible in a specific area over a short time period), a regular survey or records from a specific location. Activities can also be accessed by national schemes and societies and NBIS, adding greater value to the data collected as it can be incorporated into these databases. Records submitted via iRecord will need to be downloaded and collated by NBIS and verified by county recorders, so there may be a delay in records being available for reporting. It is strongly advised not to set up bespoke

recording systems for managing records as part of ongoing monitoring to avoid an unnecessary proliferation of similar systems and datasets needing to be brought together.

4.2. Support with species identification

22. [iNaturalist](#) is a global recording network and [iSpot](#) is a UK-based community. Both can be used to gain support with species identification, however it is still recommended that these records are submitted to iRecord once confirmed. Support with species identification can also be gained through local naturalist groups, or by asking the relevant [County Recorder](#) for the group.

4.3. How biological records are managed by NBIS

Data validation

23. Survey and monitoring data sent to NBIS is manually validated on arrival to ensure that the grid reference and the location match, and that all the details required in a record (What, When, Where, Who) are included. They are then uploaded to the NBIS database alongside metadata details on how the survey was carried out. Each record is further automatically validated on entry, for example checking that the date is valid and the species name is spelled correctly.

Data verification

24. Records for each taxon group are sent to the appropriate County Recorder to be verified before being used in NBIS data enquiries for planning, biodiversity conservation etc. Recorder names are not released in data enquiries.

Data ownership

25. Individual biological records cannot be copyrighted, given ownership, or intellectual property. However, where these data have been collated in a way that creates or implies ownership, all data remains the intellectual property and in the ownership and copyright of the original recorder(s). NBIS follows best practice in treating all records in accordance with the original recorder's (or their subsequent custodian - such as the County Recorder's) wishes, including recognising the rights of recorder(s) to control their records. NBIS will seek permissions where necessary and acknowledge the recorder(s) where appropriate and feasible. For further details of legal rights and best practice, please see the following links: [IPR of the data recorder](#); [NBN data ownership 2019](#); [Archive discussion on permission to share and use existing data](#).

Data sharing

26. Data sharing varies between taxon groups, however in general, records submitted to NBIS are passed to the County Recorders. Once verified, records will be uploaded to the NBN Atlas. County Recorders may also pass the relevant records on to their National Schemes and Societies.

County Recorders pass any records to NBIS that were sent directly to themselves.

Records from National Schemes and Societies that have not been sent to NBIS are obtained either directly from that National Scheme and Society or via the NBN Atlas.

Data received by NBIS directly, from County Recorders, downloaded from iRecord or the National Biodiversity Network (NBN) Atlas, from National Schemes and Societies, from local groups or NGOs, from local authorities or Defra agencies are collated and managed by NBIS and can be provided on request. To manage the process most effectively it is recommended that a Data Exchange Agreement or Data Sharing Agreement is set up between NBIS and Norwich CC.

Appendix SM4: Survey and monitoring questionnaire results

Contents

1. Introduction	1
2. The Questions	1
3. The Responses	2

1. Introduction

To understand the biodiversity survey and monitoring already taking place in Norwich, a short online survey was sent to stakeholders. The results of this survey are presented here. A summary of the resulting implications and key actions are provided in Section 3 of the Survey and Monitoring Framework.

2. The Questions

The online survey asked the following questions:

1. What species/species group(s) have you or your local group surveyed/monitored? Please specify which sites/locations the survey/monitoring refers to, whether they were a one-off survey or long-term study.
2. What methods did you/do you use for these surveys/monitoring? e.g. bat detector, pan traps, transects, BTO Breeding Bird Survey methods.
3. What species/species groups do you think are priorities for your site for future surveys/monitoring?
4. What resources are available to you for long-term monitoring (as opposed to one-off surveys)? This might be volunteer time, equipment, funding, support/advice from other organisations.
5. What skills and training do you think are needed for long-term monitoring, either within your local group or more generally across Norwich?

3. The Responses

There were 14 responses to the questionnaire and the results are summarised below:

What species/species group(s) have you or your local group surveyed/monitored? (Q1)	SITES surveyed/monitored (Q1)	Survey (S), monitoring (M) and/or recording (R) (Q1)	What methods did you/do you use for these surveys/monitoring? (Q2)	What species/species groups do you think are priorities for your site for future surveys/monitoring? (Q3)	Systems of recording mentioned
Wildflowers/higher plants/vascular plants	Yare valley / Norwich fringe (e.g. Eaton, Marston Marshes). Whole of Norwich. Earlham Cemetery	S (long term) R (ad hoc) M	Quadrats; Opportunistic survey, usually on monad-by-monad basis	Wildflowers/higher plants/vascular plants	iRecord or spreadsheets sent to county recorders
Mammals	Yare valley / Norwich fringe (e.g. Eaton, Marston Marsh); Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park	S, R (ad hoc)	small mammal trapping; wildlife camera, camera		
Fungi	Earlham Cemetery	M	Opportunistic survey	Fungi	iRecord or spreadsheets sent to county recorders.
Birds (including Swifts - nest sites/colonies)	Earlham Cemetery; Greater Norwich; Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park	S, M	Opportunistic survey in day and evening (swifts); aural recording	Swifts	Bird Track; swiftmapper.org.uk; iRecord or spreadsheets sent to county recorders

What species/species group(s) have you or your local group surveyed/monitored? (Q1)	SITES surveyed/monitored (Q1)	Survey (S), monitoring (M) and/or recording (R) (Q1)	What methods did you/do you use for these surveys/monitoring? (Q2)	What species/species groups do you think are priorities for your site for future surveys/monitoring? (Q3)	Systems of recording mentioned
Other insects (hoverflies; beetles but also other groups such as Hemiptera, spiders, harvestmen)	Earlham and Rosary Cemeteries; Sweetbriar Marshes; Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park; Norwich; Sweetbriar Marshes	M, S (full invertebrate) R (ad hoc)	Day observation, including searching on leaves, under wood, on flowers; sweeping; beating tray; sieving; suction sampling; aural recording	All invertebrate groups, spiders	iRecord or spreadsheets sent to county recorders.
Butterflies/moths	Earlham and Rosary Cemeteries; Sweetbriar Marshes; Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park; Norwich; Sweetbriar Marshes; Marston Marshes	M, S (full invertebrate at Sweetbriar Marshes; annual butterfly survey at Marston Marshes) R (ad hoc)	Moth trapping; sweep netting		iRecord or spreadsheets sent to county recorders.
Bees and aculeate wasps	Earlham and Rosary Cemeteries; Sweetbriar Marshes; Norwich; Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park	M R (ad-hoc) S	Day observation, including searching on leaves, under wood, on flowers, nest sites; sweep netting, pan trapping	Bees and aculeate wasps and other pollinators, especially solitary bees/wasps	iRecord or spreadsheets sent to county recorders.

What species/species group(s) have you or your local group surveyed/monitored? (Q1)	SITES surveyed/monitored (Q1)	Survey (S), monitoring (M) and/or recording (R) (Q1)	What methods did you/do you use for these surveys/monitoring? (Q2)	What species/species groups do you think are priorities for your site for future surveys/monitoring? (Q3)	Systems of recording mentioned
Odonata (dragonflies and damselflies)	Norwich	R (ad-hoc)	Opportunistic survey		iRecord or spreadsheets sent to county recorders, with some in iRecord originating from BirdTrack or the UKBMS
Lichens	Earlham cemetery; Cathedral Close; Riverside areas	R (ad-hoc)	Opportunistic survey	Lichens	
Fish	Thorpe Hamlet, Whitlingham, Mousehold Heath, Earlham Park	S	Fishing rod, wildlife camera, camera		
Habitats	CWS; Marston Marshes	S (Phase 1), NVC	NVC quadrat survey		

Q4 - What resources are available to you for long-term monitoring (as opposed to one-off surveys)?

- Quadrats
- ID books, website e.g. Norfolk Moth Survey
- Volunteer time (1 example: c15 regular attendees and perhaps 30 people through course of 1 year)
- Support and ID assistance via BSBI, British Lichen Society
- Local naturalist expertise (e.g. County Recorders)
- Time to carry out determination of specimens (including large quantities)

Q5 - What skills and training do you think are needed for long-term monitoring?

- Plant ID, quadrat surveying.
- Lack of time prevents people doing more survey work/monitoring.
- Invertebrate ID skills.
- Standardised sampling protocols including rotating sites so volunteers do not get bored of the same site; tapping into how people like to enjoy, record and report species data will be more likely to get commitment.
- General increasing awareness of Swifts with Norwich residents/roofers/builders - both in terms of ID and their requirements for nesting.
- Trained to a level where they could identify commoner lichen species.
- Pairing volunteers collecting species with constant effort standard methodology with expert determiners could be a good use of available resources.
- Training in Spider identification.

In response to species priorities for survey and monitoring in Norwich, respondents thought it important to:

- Identify important species present on green spaces managed by Norwich City Council to produce a baseline, and subsequently monitor species assemblages over time to detect changes in the composition.
- Focus on better understanding across a broad taxonomic spectrum.
- Conduct NVC level surveys, surveys for bats, birds, dragonflies and butterflies.

In response to what skills and training are needed for long-term monitoring, respondents made the following points:

- Long-term species monitoring requires specialist skills, although skills to collect species takes less time.

- Long-term monitoring requires a significant commitment. Focus on a particular species close to recorders' homes.
- Involve multiple groups for repeat monitoring of sites, to keep interest and provide variety.
- Monitoring of lawn biodiversity could be interesting as potential invertebrate habitat.
- Fringe Project: Identify priority sites for surveying and the best survey techniques to use. Train volunteers.