



University  
of Exeter

Sustainability



**Monitoring Biodiversity:  
University of Exeter Campuses**

# Monitoring Biodiversity: University of Exeter Campuses

## Summary:

The University of Exeter's Biodiversity Monitoring Plan provides a structured, long-term framework for tracking biodiversity across its campuses. The plan supports the University's Nature Positive commitments by establishing consistent monitoring methods, prioritised species and habitats, and robust data management systems.

## Aims

The plan has two primary aims:

- Track biodiversity change across campuses and understand long-term impacts of land management decisions.
- Assess progress against Nature Positive targets, specifically:  
Increasing habitat biodiversity value by 20% by 2030 (stretch target 30%) from a 2020 baseline.  
Ensuring wildlife populations remain stable or increase.

## Approach

- Given finite resources, the plan focuses on cost-effective, repeatable monitoring methods that measure both species abundance and species richness. It emphasises:
  - Realistic, long-term data collection (recognising slow species responses and natural variation).
  - Adaptability as new species or technologies emerge.
  - Additional short-term monitoring for targeted interventions.

## Scope

- Covering University of Exeter campuses at Streatham, St Lukes, Lower Hoopern Valley (LHV) and in Penryn. Monitoring programmes differ across campuses based on habitats, species present, and resources.
- Dedicated habitat monitoring may be required for the LHV under Biodiversity Net Gain requirements.
- Separate work covers biodiversity foot printing and campus green space assessments.

## Method Selection

- Methods were prioritised by the Biodiversity Task and Finish Group using criteria including ecological sensitivity, conservation status, relevance to campus management, umbrella species potential, contribution to wider national recording schemes and public engagement value.
- A broad suite of monitoring techniques was considered, including traditional surveys, citizen science, sensors, and emerging technologies such as eDNA.

## Suggested Monitoring Activities

A comprehensive monitoring programme was suggested including:

- Habitat condition assessments using the Biodiversity Net Gain framework.
- Species surveys, including long-running bird surveys, UKBMS butterfly transects, BeeWalks, dormouse monitoring, and brown hairstreak egg counts.
- Sensor-based monitoring (bats, birds, mammals) with frequency to be established after trials.

- Citizen science initiatives, including iNaturalist projects and national surveys like the RSPB Big Garden Birdwatch.
- Specialist monitoring such as water flow measurements.

## Data Management

The plan highlights the need for:

- GIS-based systems for spatial data.
- Potential development of a centralised, accessible biodiversity database.
- Local copies of all citizen science data and submission to local records centres (ERCCIS, DBRC).

## Review and adapt

- Monitoring plans should be live documents and updated and adapt to new findings and changes in resources.

## 1. Introduction:

- While understanding the impact of activities on all aspects of biodiversity is important, limited resources mean that we cannot measure everything in a structured fashion.
- Monitoring schemes need to incorporate species abundance as well as the number of different species where possible; although the presence of different species is also important.
- Monitoring plans need to be realistic and ongoing – the value in monitoring data often only becomes apparent after many years of data collection; species can be slow to respond to changes, and interannual variation affects population sizes.
- The monitoring plan needs to be adaptive. With new species being recorded, the monitoring plan may need to change to accommodate these.
- Short term monitoring may be required to understand the impacts of specific interventions.

## 2. Aims of the biodiversity monitoring plan:

To monitor biodiversity across University of Exeter campuses and to understand the long-term impacts of any changes in management on biodiversity.

To provide data to assess progress for the following targets from the Nature Positive Plan:

1.1 Biodiversity value of University Campuses is increased by 20% for habitats by 2030, with a stretch goal of 30%, from a baseline of 2020<sup>1</sup>.

1.2 Increasing or stable wildlife populations on University campuses.

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<sup>1</sup> Note the different campuses have had baselines assessed between 2019 and 2021 and we will use these as an approximation of the 2020 baseline. The 20% gain refers to existing land holdings. New University land holdings will be required to also reach 20% net gain, unless explicitly purchased as a biodiversity offsetting unit.

### 3. Scope

- Monitoring programs may vary between campuses, given the size of campuses, specific species and habitats present, and resources available. The monitoring carried out on each campus is specified, but this plan covers the Streatham Campus, Penryn Campus and St Luke's Campus.
- The Lower Hoopern Valley (LHV) will have a specific plant/habitat monitoring plan as required by the new Biodiversity Net Gain habitat bank requirements, outlined in the habitat management and monitoring plan.
- Two other key aspects of monitoring relating to the Nature Positive Strategy - biodiversity foot printing and campus green space survey - are covered in detail elsewhere.

### 4. Method selection

- The long list of methods (see Appendix 2) was considered by the Biodiversity Task and Finish Group.
- Several groups/species have been prioritised including -
  - Those likely to respond to campus/horticultural management;
  - Protected species;
  - Species with a conservation status of being known to be at risk due to population declines such as an international or GB Red list status of vulnerable or endangered, or being listed in local policy as a species of conservation concern;
  - Those which may act as an umbrella species (a species where conservation actions to protect these species will benefit other species as well);
  - Those which have potential to engage people in monitoring.

### 5. Current methods implemented

Monitoring Program	Targeted towards	Priority	Campus	Frequency	Comments
Habitat area and condition scores using Biodiversity Net Gain framework, adapted for use with ornamental plantings.	Habitats	1	Streatham, Penryn, St Lukes	3 years	Given the size of University campuses, and rate of change to habitats, annual monitoring is expensive and time consuming. Records of biodiversity interventions to habitats will be kept annually such as areas of mowing mosaics and invasive species interventions.
Number of biodiversity interventions and actions	Habitats	1	Streatham, Penryn, St Lukes	Updated with new interventions as installed	

Monitoring Program	Targeted towards	Priority	Campus	Frequency	Comments
Water flow monitoring	Habitats	1	Streatham	Continuous, automated	Set up in collaboration with CREWW and the Geography Department to understand impacts of nature-based flood management solutions.
UoE Grounds bird survey	Species overall	1	Streatham, St Lukes	Twice yearly	This extremely valuable data set has been running for over 10 years and has been used for student research projects and to target actions.
Sensor-based monitoring program: Bats	Species overall	1	Streatham, Penryn, St Lukes	TBC	Following trial in April-May 2026, decide on frequency.
Sensor-based monitoring program: Birds	Species overall	1	Streatham, Penryn, St Lukes	TBC	Following trial in April-May 2026, decide on frequency.
Sensor-based monitoring program: mammals (camera traps)	Species overall	1	Streatham, Penryn, St Lukes	TBC	Following trial in April-May 2026, decide on frequency.
UKBMS	Species overall	1	LHV	Annual	
BeeWalk	Species overall	1	LHV	Annual	
Brown hairstreak egg count	Protected species		Streatham	Annual	
Dormice - National Dormouse Monitoring Scheme	Protected species	1	Streatham	Twice yearly	Run on Streatham Campus in collaboration with Devon Mammal Group. Requires dormouse licence.
<b>Citizen science engagement monitoring</b>					
iNaturalist Projects	Species overall	1	Streatham, Penryn, St Lukes, Duckes Meadow, Topsham, LHV	Ad hoc. Results downloaded 1 per year.	These have been set up as two iNaturalist projects: University campuses Exeter, covering all Exeter landholdings and Penryn & Falmouth.
RSPB Big Garden Birdwatch	Species overall	2.5	Streatham	Annual	
Big Butterfly Count	Species overall	2.5	Streatham	Annual	
<b>Ongoing monitoring by others</b>					
Moth trapping	Species overall		Streatham		Ad hoc moth trapping.
Bioblitz	Species overall		Penryn		Annual bioblitz run by EcoSoc.

## 6. Methods requiring volunteer involvement.

Monitoring Program	Priority	Campus	Frequency	Comments
Freshwater quality monitoring	1			
National Hedgehog Monitoring Scheme		Penryn		We have been in discussion with ERCCIS about potentially being a site, however, the campus is too small so requires additional land. Streatham has rarely recorded any hedgehogs, despite dedicated sniffer dog searches.
National Amphibian Monitoring Survey (newt survey)	1	Streatham	Annual	Palmate newts and Great crested newt eDNA recorded on Streatham Campus.
National Amphibian Monitoring Survey (frog and toad survey)	1	Streatham	Annual	
UKBMS	1	Penryn	Annual	Previously run on Penryn Campus, we seek volunteers to run this again.
BeeWalk	1	Penryn	Annual	We seek volunteers to run this on Penryn campus.

## 7. Data management and analysis

- Geographic Information System (GIS) required for survey locations/sightings/habitat-based surveys: UoE supports ArcGIS and QGIS, and the general system is ArcGIS, however this causes licencing issues for associated colleagues such as FXPlus and contractors who may not have access.
- Consider a bespoke data storage system; to allow easy access to and display of records, as multiyear datasets but also adhoc data and reports which may otherwise be less visible or usable. The alternative is a series of MExcel files which become increasingly difficult to manage or combine.
- Most citizen science schemes let you download your own data (check at what resolution before committing); a local copy should be held in addition to entering into the scheme website.
- Ensure all data uploaded to local records centre; most national schemes submit records to National Biodiversity Network (NBN) as standard but check which ones will filter to local records centre with ERCCIS (Cornwall) and DBRC (Devon).
- Automated/AI data pipelines mean that the possibility of using acoustic sensors and grid-based camera trapping becomes more realistic, as data processing has historically been a time consuming and specialist job.
- Data processing and analysis, potentially use R Shiny apps, ArcGIS or PowerBI, to create a dashboard of outcomes and key metrics.
- For better display and visibility of spatial data, internal facing (for use in operations) or publicly available maps may be required, using a GIS and sitting within the campus maps developed by the Digital Estates Team.

## 8. Resources:

**Time:** approx. 105 survey/data entry days throughout the year (see Table 1), approximately 0.6 FTE.

Note that many of these can involve people being trained up to carry out, so potentially volunteers can be used or interested members of staff/the Grounds Team.

**Equipment:** The majority of these methods are relatively low cost; key expenditures are likely to be:

- Sensor-based monitoring programme - Bat detectors/audio detectors/camera traps for grid-based survey
- GPS
- Binoculars
- Dormouse boxes and tunnels if required
- Consultants requiring specialist licence for some species, for example dormice.

## 9. Review:

If new species are discovered on campus, or new activities contributing to nature positive actions, or resource levels change, specific monitoring programs may need to be added or reviewed.

## APPENDIX 1

### 10. Detailed information on methods and selection

#### 10.1. Potential Monitoring Options

- Considered by the Biodiversity Task and Finish Group, led by Professor Juliet Osborne and including Dr Kelly Moyes, Abhishek Dixit (FXPlus Biodiversity Officer), D. Rosalind Shaw and Dr. Clive Betts.
- Focus on monitoring options which:
  - Record species likely to respond to management
  - Record species most at risk
  - Record impacts of targeted management
  - Are likely to engage people
  - Meet the suggestions for the biodiversity narratives below (charismatic/umbrella species/red list species etc).
- Monitoring methods have been sorted into a five-point scale by the group
  - High priority = 1
  - Medium Priority 3
  - Nice to have = 5
- Develop Nature Positive student research project list for 'nice to have' options.

#### Approach to recording:

- **Species lists** – great information for overall biodiversity, less useful for looking at change. Good for adding to the biodiversity narrative (new or unusual species found).
- **Abundance** – critical to look at changes over time; some citizen science schemes are designed to do that.

#### Using biodiversity as a narrative for communication :

- Indicator species that are relevant to planned management/any changes can be used to create a narrative.
- Could be used to target interventions to see a positive change in specific species.
- Ideally species that are rare; or charismatic; or can function as an 'umbrella' species resulting in positive improvements for a wide range of groups.
- Red list species – those that are threatened or rare should be a priority for any management actions, as should any BAP habitats.
- Species which have high level of protection under UK law.
- These are likely to be different species for Penryn/Streatham/St Lukes's.

#### Emerging Technologies:

##### eDNA/Genetic Techniques- Potential opportunities include:

- Ponds:
  - eDNA for presence absence of amphibians/newts etc.
  - eDNA for freshwater invertebrates
- Terrestrial:
  - Soil eDNA for plant sampling.
  - AirDNA for communities in general.
  - Adhoc use for identifying specific species

- Currently due to the technical nature of these surveys, evolving methods, challenges around interpretation and need for repeat monitoring, the best use of these methods are for ad hoc identification of species from droppings/hairs and establishing presence of amphibians in ponds.

## Sensor based Monitoring (incorporating acoustic monitoring and camera trapping):

- Static sound detectors for bats
- Static sound detectors for birds
- Camera traps
- Relatively low-cost sensors (audio moths) are now available; there are AI data pipelines and automatic recognition software which make this now a more feasible technique.

## Drones:

- Good for photo records
- Good for some publicity materials
- Potential for use to understand water flow over campus and habitat monitoring; however, there are restrictions on drone use on campus, both via internal requirements and parts of campus come under the no-fly zone for HMP Exeter, which requires further licenses.

## Species of conservation concern, all campuses :

**Table 1:** Species of conservation concern, all campuses. S = Streatham, P = Penryn, SL = St Lukes, LHV = Lower Hoopern Valley, D= Duryard. BBoC stands for Birds of Conservation Concern. Note that lack of records does not mean that species are not present

Taxon group	Common name	Campus	Conservation status	Other information
Birds	Greenfinch	S, T	BoCC 5: the red list for birds Red	
Birds	Herring gull	St, SL, T	BoCC 5: the red list for birds Red	
Birds	House sparrow	S, SL, T, LHV	BoCC 5: the red list for birds Red	
Birds	Mistle thrush	S, SL	BoCC 5: the red list for birds Red	
Birds	Redwing	S, SL	BoCC 5: the red list for birds Amber	
Birds	Song Thrush	S,T	BoCC 5: the red list for birds Amber	UK List of Priority Species
Birds	Starling	SL	BoCC 5: the red list for birds Red	
Birds	Grey wagtail	T, LHV	BoCC 5: the red list for birds Amber	
Birds	Woodcock	LHV	BoCC 5: the red list for birds Red	Probably a one-off record
Birds	Swift	S	BoCC 5: the red list for birds Red	
Birds	House Martin	T	BoCC 5: the red list for birds Red	
Birds	Spotted Flycatcher	T	BoCC 5: the red list for birds Red	
Mammals	Hazel dormouse	S,D	UK Red list Vulnerable	
Mammals	Hedgehog	T	UK Red list Vulnerable	
Mammals	Otter	LHV	UK List of Priority Species	Now a very old record
Mammals	Greater horseshoe	S	UK List of Priority Species	

Taxon group	Common name	Campus	Conservation status	Other information
Mammals	Lesser horseshoe	S	UK List of Priority Species	
Mammals	Brown long-eared bat	S	UK List of Priority Species	
Mammals	Soprano pipistrelle	S	UK List of Priority Species	
Invertebrates	Brown hairstreak	S	Vulnerable (NERC S41 species)	

**Table 2:** Current shortlist, estimate of working time for Streatham only, in days for each month of the year (top row). ‘Y’ is recorded where survey time could extend into these months if needed. Estimates include some out of peak survey time for data entry and handling.

Monitoring Program	Priority	J	F	M	A	M	J	J	A	S	O	N	D
Area and condition scores. Biodiversity Net Gain, adapted for use with ornamental plantings.	1						10	10	y	y	2	2	
Number of biodiversity interventions and actions	1			1			1			1			1
UKBMS	1				2.6	2.6	2.6	2.6	2.6	2.6	2.6		
BeeWalk	1			0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
Sensor -based monitoring program: Bats	1							4			2	4	
Sensor -based monitoring program: Birds	1	4			6	6	y						
Sensor-based monitoring program: mammals (camera traps)	1				4								
RSPB Big Garden Birdwatch	2.5	1.5											
iRecord/iNaturalist Citizen Science	1			1		1			1		1		
Freshwater quality sampling	1	1	1	1	1	1	1	1	1	1	1	1	1
National Amphibian Monitoring Survey (newt survey)	1				1	1							
National Amphibian Monitoring Survey (frog and toad survey)	1	1	1	1									
Brown hairstreak egg count												1	
Dormice - National Dormouse Monitoring Scheme (Note this needs to be carried out by people with current dormouse licence)	1					1				1			

APPENDIX 2 Long list of methods considered

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
All groups		iRecord or iNaturalist for recording ad hoc records and encouraging people to submit biodiversity sightings	Ad hoc.	P/A	H	L	✓	✓	✓	1	<a href="https://irecord.org.uk/">https://irecord.org.uk/</a> <a href="https://uk.inaturalist.org/">https://uk.inaturalist.org/</a>
Amphibians and reptiles	Newts	Count juveniles/adults visible in water bodies; presence /absence of eggs.	Annually, 4x each pond.	P/A; Ab	M	M	✓	✓	✓	2	<a href="https://amphibian-survey.arc-trust.org/pages/protocol">https://amphibian-survey.arc-trust.org/pages/protocol</a>
	Toads and frogs	Count spawn/tadpoles/juveniles /adults visible in water bodies.	Annually, 4x each pond.	P/A; Ab	M	M			✓	2	<a href="https://amphibian-survey.arc-trust.org/">https://amphibian-survey.arc-trust.org/</a>
	Reptiles	Transect walk between 0.1-3km with artificial cover items to record sightings	Annually, 6x	P/A; Ab	M	M			✓	3	<a href="https://reptile-survey.arc-trust.org/">https://reptile-survey.arc-trust.org/</a>

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
Birds	Birds	Big Garden Bird Watch	Annually	P/A; Ab	H	L	✓	✓		5	<a href="https://www.rspb.org.uk/whats-happening/big-garden-birdwatch">https://www.rspb.org.uk/whats-happening/big-garden-birdwatch</a>
		Breeding bird survey	Annually, 3x: one baseline, two survey, 1-2km walk	P/A; Ab	H	H		✓		1	<a href="https://www.bto.org/our-science/projects/breeding-bird-survey">https://www.bto.org/our-science/projects/breeding-bird-survey</a>
		Bird ringing Has to be run by trained and licenced individuals		P/A	H	H	✓			5	<a href="https://www.bto.org/get-involved/volunteer/projects/bird-ringing-scheme">https://www.bto.org/get-involved/volunteer/projects/bird-ringing-scheme</a>
		Sensor-based acoustic monitoring programme. Timing and number of surveys may be changed depending on resources.	Annually, 2x spring/summer for breeding birds, 1x winter for migratory species.	P/A; Ab	M	H		✓	✓	1	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
Ecosystem Services	Lichen as indicators of air quality	OPAL Lichen and Air Survey		P/A; Ab	L	H	✓			5	<a href="https://www.imperial.ac.uk/opal/surveys/airsurvey/">https://www.imperial.ac.uk/opal/surveys/airsurvey/</a>
	Water infiltration	Infiltration rates for different habitats			L	H		✓		2	
	Water run-off rates	Water flow sensors at key points exiting campus			L	H		✓	✓	1	
	Soil carbon	For carbon storage, loss on ignition methods			L	M		✓		4	
	Ecosystem services from trees	iTree	Annually/biennially to record loss/gain.		L	L	✓			2	<a href="https://www.itreetools.org/">https://www.itreetools.org/</a>
	Temperature regulation	Temperature measures on nature positive interventions such as green roof/ grass crete/green walls	1x		L	L		✓		5	
Fungi	Currently via iRecord/iNaturalist and ad hoc recording.	Ad hoc		P/A	M	M	✓			3	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
Habitats	Freshwaters	Water quality sampling	Monthly		L	M	✓		✓	1	<a href="https://wrt.org.uk/westcountry-csi/">https://wrt.org.uk/westcountry-csi/</a>
	Habitats	Area and condition scores. Biodiversity Net Gain, adapted for use with ornamental plantings. Covers all natural and semi-natural habitats	Annually	Area and condition	L	M				1	
		Number of biodiversity interventions and actions	Recorded through centralised data storage	P/A; Ab	M	L				1	
	Hedgerows	National hedgerow scheme		P/A	L	M	✓			5	<a href="https://hedgerowsurvey.ptes.org/the-great-british-hedgerow-survey">https://hedgerowsurvey.ptes.org/the-great-british-hedgerow-survey</a>
	Soil biodiversity	Currently quite challenging to measure due to complexity of biological communities and lack of standard metrics. eDNA potentially helpful in future								5	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
	Soil health	Possibly consider - infiltration; compaction; amount of soil of campus, soil organic matter. Decomposition surveys.			M	H		✓		5	
Invertebrates	Asian hornet monitoring station	AI monitoring stations for Asian hornet have been developed by University colleagues	During summer months	P/A	L	H	✓	✓	✓	5	Currently still in development; most Asian hornet incursions further east.
	Brown Hairstreak	Egg survey 1 x over winter early Nov-mid December over a transect of suitable habitat. Survey is up to 2 hours for one transect with additional time for set up incorporated into data entry. Recommended that more than one transect is done. One high value, one in habitat where being improved or medium.	Annually	P/A; Ab	M	M	✓		✓	1	<a href="https://ukbms.org/sites/default/files/downloads/NG3_Brown%20Hairstreak%20Egg%20Count%20Guidance.pdf">https://ukbms.org/sites/default/files/downloads/NG3_Brown%20Hairstreak%20Egg%20Count%20Guidance.pdf</a> Brown Hairstreak training session: <a href="https://www.youtube.com/watch?v=tnc1vYERhWA">https://www.youtube.com/watch?v=tnc1vYERhWA</a>

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
	Bumblebees	BeeWalk 2-3 hours per month.	Monthly	P/A; Ab	M	M	✓			1	<a href="http://www.beewalk.org">www.beewalk.org</a>
	Butterflies	UK butterfly monitoring scheme.	Weekly	P/A; Ab	M	H	✓	✓	✓	1	
	Dragonflies	Set transect (water courses) or timed point count (20 mins) for ponds.	Every 3 months	P/A; Ab	M	H		✓	✓	1	<a href="https://british-dragonflies.org.uk/recording/monitoring/">https://british-dragonflies.org.uk/recording/monitoring/</a>
	Earthworms	OPAL Earthworm and Soil Survey.		P/A; Ab	H	M	✓	✓		5	<a href="https://www.imperial.ac.uk/opal/surveys/soilsurvey/">https://www.imperial.ac.uk/opal/surveys/soilsurvey/</a>
	Freshwater Invertebrates	3-minute kick samples, alongside habitat assessments. Would require taxonomic expertise. 3 min active sampling	Annually	P/A; Ab		M		✓	✓	5	
	Moths	Moth trapping	Ad hoc	P/A; Ab	H	M		✓		2	<a href="https://butterfly-conservation.org/our-work/recording-and-monitoring/national-moth-recording-scheme">https://butterfly-conservation.org/our-work/recording-and-monitoring/national-moth-recording-scheme</a>
	Pollinators	Flower insect timed counts (FiT) as part of PoMs. Quick and broad taxa, timed 10	Minimum 1x	P/A; Ab	M	M		✓	✓	5	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
		minute counts on 50x50cm flower rich patches.									
	Saproxyllic species	Possibly hand searching or sweep netting/pitfall live traps near to deadwood piles		P/A	M	M		✓		5	
	Terrestrial invertebrate biomass	Standardised sweep netting or suction sampling or malaise trapping or pitfall trapping. Avoid any lethal methods. Taxonomic expertise required.		P/A; Ab	M	M		✓		4	
Mammals	Badgers	Identify sets, record activity as proxy, how many active holes, finding latrines.	Annually	P/A; Ab	L	L				4	
	Bats	Sensor-based monitoring programme - acoustic	Annually	P/A; Ab	L	M		✓	✓	1	
		Sunset survey			P/A	H	L		✓		5
		National Bat Monitoring Programme field survey. Useful in areas with light pollution. Suggest 2 evening	Annually	P/A; Ab	H	M	✓	✓	✓	5	<a href="https://www.bats.org.uk/our-work/national-bat-monitoring-programme/surveys/field-survey">https://www.bats.org.uk/our-work/national-bat-monitoring-programme/surveys/field-survey</a>

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		surveys, 90 mins each, 12 stops and starts 20 mins after sunset.									
		Roost assessment/emergence surveys		P/A	H	H		✓		5	
	Dormice	National Dormouse Monitoring Scheme. Recommended 5- nest boxes, checked twice a year, carried out by dormouse licence holder.	Annually, 1x Spring, 1x Autumn, box cleaning over winter	P/A; Ab	M	H	✓			1	<a href="https://ptes.org/campaigns/dormice/surveying-and-monitoring-hazel-dormice/national-dormouse-monitoring-programme/">https://ptes.org/campaigns/dormice/surveying-and-monitoring-hazel-dormice/national-dormouse-monitoring-programme/</a>
		Footprint tunnel survey	Initial survey with potential follow up surveys	P/A	H	M		✓	✓	1	<a href="https://ptes.org/get-involved/surveys/countryside/survey-hazel-dormice/national-dormouse-footprint-tunnel-survey/">https://ptes.org/get-involved/surveys/countryside/survey-hazel-dormice/national-dormouse-footprint-tunnel-survey/</a>
	Terrestrial mammals - covers badgers,	Sensor-based monitoring program- camera traps	Annually	P/A; Ab	H	H		✓	✓	1	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
	foxes, deer, hedgehogs, otters, weasels, stoats										
	Terrestrial mammals - covers badgers, foxes, deer, hedgehogs, otters, weasels, stoats	Mammal tracker- walk a set transect every year recording tracks and signs as an engagement event.	Annually	P/A	H	M	✓	✓	✓	5	Note that the Mammal Society runs a University mammal challenge using mammal tracker <a href="https://mammal.org.uk/for-students/university-mammal-challenge">https://mammal.org.uk/for-students/university-mammal-challenge</a>
	Harvest mice	Search for old harvest mice nests in brambles/long vegetation between October and March	Annually to every 7 years.	P/A	H	L				5	<a href="https://www.mammal.org.uk/science-research/harvest-mouse-project/">https://www.mammal.org.uk/science-research/harvest-mouse-project/</a>
	Hedgehogs	National Hedgehog monitoring program	Annually	P/A; Ab	M	H	✓			1	<a href="https://www.britishhedgehogs.org.uk/national-hedgehog-monitoring-programme/">https://www.britishhedgehogs.org.uk/national-hedgehog-monitoring-programme/</a>

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
		Foot print survey using baited tunnels. A survey takes 6.5 days.	Annually	P/A	H	H		✓	✓	5	<a href="https://ptes.org/wp-content/uploads/2015/06/Guidance-for-detecting-hedgehogs-using-tracking-tunnels.pdf">https://ptes.org/wp-content/uploads/2015/06/Guidance-for-detecting-hedgehogs-using-tracking-tunnels.pdf</a>
	Otters	Annual search for latrines/activity signs. Camera trapping	Annually	P/A	L	H				5	
	Small mammals	Live trapping or footprint tunnels. Ethical considerations around liv trapping	Annually	P/A; Ab	M	H		✓		5	
Plants	Plants	Every Flower Counts. Count the number of flowers in specified number of quadrats in different habitats.	Annually	P/A; Ab	H	M	✓	✓		2	<a href="https://www.plantlife.org.uk/our-work/npms-national-plant-monitoring-scheme/">https://www.plantlife.org.uk/our-work/npms-national-plant-monitoring-scheme/</a>
		Grassland condition scores, particularly useful for wildflower habitats. Plantlife rapid meadow assessment (species richness included, target list of indicators).	Annually	P/A; Ab	L	L		✓		5	

General group	Specific group	Method	How often?	Measurement type (P/A= presence /absence; Ab=Abundance or abundance)	Usefulness as engagement tool (High, Medium, Low)	Commitment required (time, energy resources. High, Medium, Low)	National recording scheme	Potential as student project	Potential for curriculum integration	Priority (1- highest to 5-lowest)	External Links
		National Plant Monitoring scheme. PlantLife has good standard method. Five plots at the 5m x 5m or 1m x 25m scale, in an assigned 1km monitoring square. Number and abundance of indicator species on DOMIN scale. Focuses on semi natural habitats. Plots within the 1km square selected at random.	Annually, 2x	P/A; Ab	M	M	✓			5	<a href="https://www.plantlife.org.uk/our-work/npms-national-plant-monitoring-scheme/">https://www.plantlife.org.uk/our-work/npms-national-plant-monitoring-scheme/</a>
		iTree – measures trees and the ecosystem services they provide such as carbon storage and water absorption	Every 2-3 years	P/A; Ab	L	L	✓			2	<a href="https://www.itreetools.org/">https://www.itreetools.org/</a>
Global biodiversity impacts		Foot printing analysis to be repeated biennially to track progress; LCA analysis based on scope 1,2 and 3 data but with procurement spend separated	Biennially			L				1	

