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Project Scope

Community Science: Resources to Survey and Map Ecosystems and Natural Environment Assets

October 2023

Specification of Requirements

The Authority is Natural England. The Authority's priorities are to secure a healthy natural environment; a sustainable, low-carbon economy; a thriving farming sector and a sustainable, healthy and secure food supply. Further information about the Authority can be found at: <https://www.gov.uk/government/organisations/natural-england>.

1. About Natural England

Natural England (NE) is the government's advisor on the natural environment. We provide practical advice, grounded in science, on how best to safeguard England's natural wealth for the benefit of everyone. Our remit is to ensure sustainable stewardship of the land and sea so that people and nature can thrive. It is our

responsibility to see that England's rich natural environment can adapt and survive intact for future generations to enjoy.

2. Project Background

2.1 Natural Capital and Ecosystems Assessment

The Natural Capital and Ecosystems Assessment (NCEA) programme will transform and innovate the way our evidence-base is captured, analysed, and brought together to ensure science meets the needs of policy/decision makers to embed a natural capital approach, allowing us to leave our environment in a better state than we found it.

The NCEA will provide a holistic, accurate and robust set of evidence and data for Defra, and other arm's length bodies, to make informed policy decisions about the state of our natural capital assets in high profile policy areas and lead to better outcomes for the environment. It will also identify innovative and transformative ways of collecting, analysing, and distributing the data.

- Better data and evidence are required so that government and society can:
- Understand our natural capital, how and why it is changing.
- Tackle pressures on the environment and the drivers of change.
- Take biodiversity and natural capital into account in decision making.
- Target action where it will be most effective.
- Evaluate policies and interventions to improve their effectiveness across Defra bodies.

2.2 NCEA Community Science workstream

Community Science - often synonymous with the term Citizen Science, but with more inclusive connotations - (CS) is one of the cross-cutting tools we have for collecting data, alongside professional surveys, and earth observation. CS is already essential to environmental policy, forming the majority of current biodiversity monitoring in the UK. It complements and augments standard scientific approaches. Critically it has the potential to contribute even more significant amounts of useful data in places and of a richness that cannot be achieved by other means. The approach also provides an important means for members of the public to connect with nature and the environment, further developing and deepening their appreciation and understanding of its importance and benefit to us.

2.2.1 Supporting future community science development.

Community Science provides an important source of environmental evidence informing government policy, programmes, and projects. However, the full value,

impact, and potential of Community Science for government, society, communities, and individuals, is limited by several factors, including:

- Insufficient guidance on the form, format and subject of study that enable effective detection, measurement, record making and data integration.
- A limited amount and lack of awareness of opportunities, capacity, and capability of people to participate.
- The extent and coordination of broad, strategic sponsorship, guidance, and support of volunteers.

Government investment in and use of community science data is already extensive and has been effectively developed to suit specific purposes but there is great potential to increase its reach, utility, and value. Public sector policy, programme and project use has focussed more on the acquisition and application of existing/historic data (that is already collected) than the design, support, and collection of new/future data (survey effort). As a result:

- Community science presents a more involved method of data collection than contracted professionals or staff led survey and these approaches are considered exclusive of each other.
- Use of community science data is weighted towards surveillance (detecting general change and trends) as opposed to monitoring impacts (pressures and interventions as drivers of change).
- Data mobilisation issues that impede public sector and open reuse are not identified or addressed early enough in the pathway from collection to end use.
- Environmental community science investment, projects and initiatives remain disparate limiting their collective value, efficiency, and overall benefit.

Within this context, Natural England want to investigate alternative approaches to help the wider community of performers and stakeholders address these issues and opportunities at scale across England. We would like to create the capacity to:

- Explore the current and potential future role of community science - opportunities to further develop and enhance the role of community science studies of nature and the environment across England.
- Coordinate and combine effort and resources: convene sponsors and stakeholders at a regional, strategic operational scale to share why, what, and how we each study nature and the environment, the extent to which volunteers are involved and potential to improve and grow this.
- Better engage, enable, and guide public participants: to explore the impact of more capacity to engage, support and coordinate public participants and sponsors of practice, projects and initiatives that study and generate data on elements of nature and the environment.
- Share priorities, methods, tools, approaches, systems and especially our collective experience and lessons to better inform and evolve common guidance, standards, and resources.

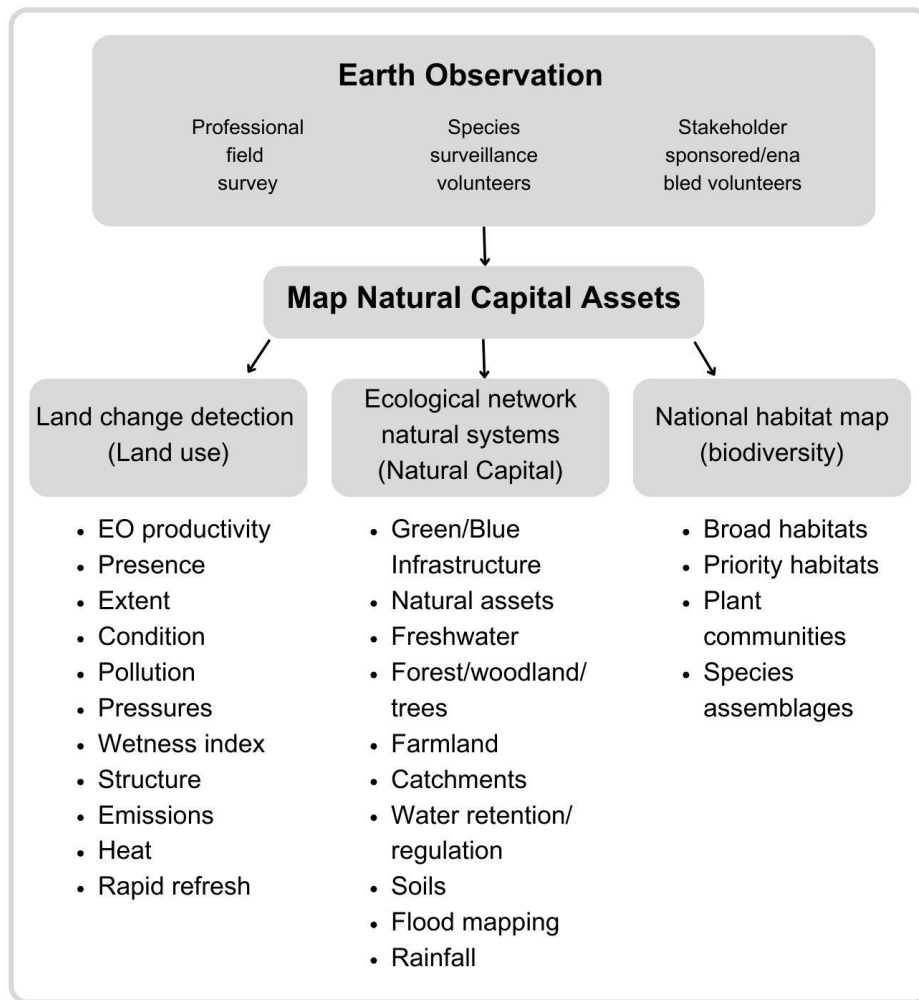
2.3 Earth Observation and Habitat Mapping

To successfully recover biodiversity and improve the environment it is vital that we understand the location, extent, and condition of natural capital and ecosystem assets across England. The NCEA programme is funding several analysis and mapping projects that aim to improve our ability to derive this knowledge from available data sources. The available data sources largely comprise a) available data shared and collated from various past field surveys, and b) new data sourced from earth observation satellites.

Field survey data focussed on surveying and recording habitats has been varied and infrequent largely due to its complexity. Surveys in the '90s provided baseline data for many local wildlife sites. However, existing field data for priority habitats is somewhat limited to protected areas (SSSI's, SACs) and some data from agri-environment applications and management plans. Availability of past survey data also limits the evidence available to inform and underpin national mapping.

Earth observation (EO) offers comprehensive data collection across the UK. However, the data has limited resolution and must be interpreted to derive the ecological and environmental nature of land cover and may not be sufficient to provide meaningful local scale information. EO is being used to map Green/Blue infrastructure (GI), national forest inventory (NFI), derive habitat probability maps for England (Living England) and other significant natural environments. The analytical models used to achieve this need to be tested and refined to tune their accuracy and reliability. Testing and tuning requires field visits at scale by people to ground truth the interpretations and provide additional data to affirm or correct the models and results.

We have identified some current streams of habitat data collection, although there may be others. Professional survey – often driven by specific project needs, Species surveillance volunteers – existing interest and field experience, and other stakeholder sponsored volunteers – specific habitat monitoring schemes (E.g., Habimap). Professional survey offers a limited source of field data, but community science has potential to provide additional capability and capacity. The below illustration demonstrates the potential for these various recorders to contribute to different aspects of Natural Capital asset mapping.



2.4 Potential for community science to contribute to NCEA models and maps.

Modern data sources and analytical techniques are changing the opportunities for field surveys to meaningfully inform the location, extent, and condition of natural capital and ecosystem assets across England. More varied and simplified survey effort is increasing the potential for community scientists to contribute to our understanding and provide ground truthing capacity.

However, engaging and making use of community science can be difficult and involved. The NCEA community science project aims to provide Defra group capacity to meaningfully consider or harness community science as a source of data. We have engaged local pilot groups which will offer an experimental means for Defra group to engage, influence, direct and co-create community science survey effort at scale. We need to ensure we can guide and enable that effort by providing guidelines, replicable tools, protocols and resources.

2.5 Existing work and support

This work will gain insight from and build on existing experience of CS, EO and habitat mapping from within NCEA and beyond. This includes, but is not limited to:

- Living England
- Priority Habitats
- Habitat Probability Map
- National Forest Inventory
- Green / Blue infrastructure
- Heatmap expansion
- Work conducted by NE habitat specialists
- Evaluating the potential to record habitat information for Earth Observation through volunteer recording initiatives (JNCC, 2022)

3. Vision / Ambition

The use of community science has the potential to close the loop between production and release of asset maps, active updates and improvement and user community acceptance of these. The NCEA project is interested in better understanding the current state of habitat monitoring and earth observation activity across England.

3.1 Project Aims and Objectives

This contract aims to identify and bring together existing stakeholders, methods, tools and data in a habitat mapping space. It will investigate, collate and describe the current role and future potential of community science in contributing to national habitat monitoring, including, but not limited to.

- i. Ground truthing (validate/verify) existing mapping.
- ii. Collecting useful field data to inform, correct and update existing mapping.
- iii. Identify gaps within existing mapping.

The aims of the contract are listed below, along with the associated objectives and outputs.

A. Map land cover through a Natural Capital lens

- Identify and describe **what** stakeholders are currently trying to map in terms of land cover, natural capital/environment systems, assets, features.
- Identify existing purpose and reasoning (**why** are stakeholders mapping these)
- Identify **how** the information is being used and shared.
- Identify **who** is, and could, undertake the work.

Project output – An analysis of the current activity in the habitat mapping space, defining what, why and how stakeholders are trying to record habitats. This should be delivered in a detailed spreadsheet and summarised in the final report.

B. Detect change and drivers of change.

- Investigate **how** stakeholders are detecting, measuring and recording presence, extent, quality? Identify existing technology, protocols, tools, models and data (both internally and externally) which are being used to describe and monitor habitats, land cover and naturalness (location, extent, condition) across England.
- Identify **what** these efforts tell us (if anything) about pressures or interventions - the drivers of change.

Project output – An assimilation of research into existing methods, tools, data and technologies which are deployed to describe and monitor habitats, including what they are/aren't capable of and how they relate to change detection. This should be delivered in a detailed spreadsheet and summarised in the final report.

C. Ability to detect and attribute benefits.

- Describe the extent to which identified methods, data and maps relate to Natural Capital assets, service flows and benefits

Project output – A detailed overview of how the identified methods and tools contribute to Natural Capital assets and benefits. This can be displayed in either spreadsheet or written terms but should be summarised in the final report.

A. Assert and trial approaches

- Describe how we could structure and share these learnings so that landscape scale recovery projects could make use of earth observation derived maps and the survey tools available to help refine, supplement, and update those maps.