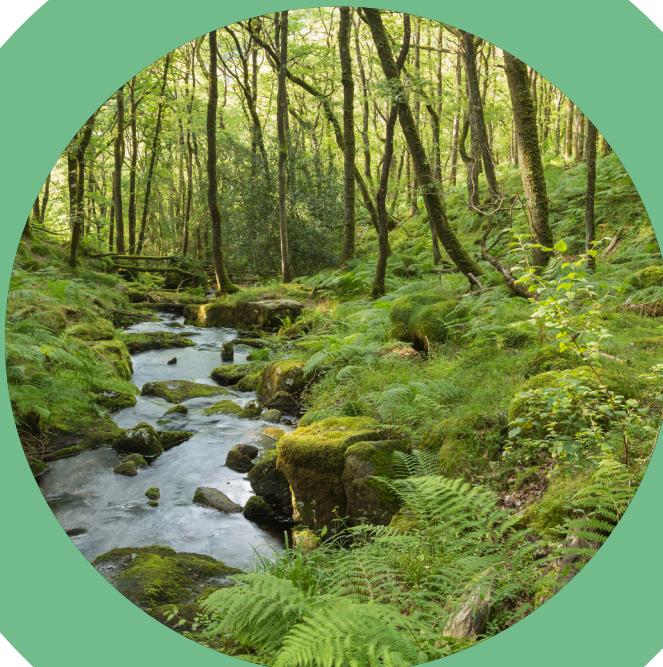


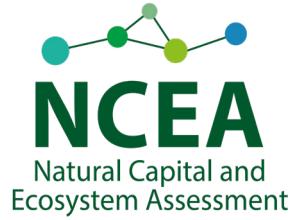
V1.1 Spring 2025 Edition



NCEA PRODUCT BROCHURE

By the Natural Capital and
Ecosystem Assessment programme

Foreword



David Jones, Senior Responsible Owner of the Natural Capital and Ecosystem Assessment programme

I am delighted to present the Spring 2025 version of the **Natural Capital and Ecosystem Assessment (NCEA) programme** product brochure. Future versions will reflect new and revised products as they are delivered.

This brochure provides an overview of some of the key product collections the programme is delivering with examples of how they are currently being used. A product collection will often include a series of underpinning datasets, map layers, protocols, standards as well as summary reports and publications. We intend to release all relevant components of a product collections under Open Government Licence wherever possible.

To aid your navigation through the brochure we have presented the product collections by categories based on the habitats and ecosystems they relate to. We have included actual and potential use cases to demonstrate how the products have been, or could be, applied to real life challenges.

We are delivering this programme of work in partnership with our Arm's Length Bodies and I would like to extend my gratitude to everyone working on the programme who is helping us to deliver this fantastic work. In particular, I would like to thank our key deliver partners: Natural England, Environment Agency, Forest Research, JNCC, and Royal Botanical Gardens Kew.

I hope this brochure provides both a useful insight into the work of the programme and the many uses our outputs have within Defra, Government, and beyond. You can access all the products referenced in this brochure and all our future publications, including our Analysis Ready data via our Natural Capital Search Engine. My team and I look forward to receiving feedback or details of how you are using our data via nceaprogramme@defra.gov.uk.



Natural Capital
Search Engine

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What is the NCEA programme?

NCEA is Defra's largest R&D programme, responding to recommendations by the Natural Capital Committee and the Dasgupta Review on the Economics of Biodiversity to change the way we think about and value nature.

Ecosystem assessment tells us about the health of our natural environment and how this is changing over time, whereas a natural capital approach describes the environmental, social, and economic value our natural environment holds for people. Together, these approaches provide a **holistic and joined-up view of our natural environment**. They enable us to identify connections, dependencies, and trade-offs between policy ambitions and to make better-informed decisions that truly benefit people and nature.

To ensure we have more data sets, NCEA is combining **remote sensing** (such as satellite and aerial photography) with **boots-on-the-ground professional field surveying**, in addition to developing our **citizen science capability**.

To strengthen the UK's position as a science leader, the programme is capitalising on **ground-breaking scientific developments, new technology and innovative systems**, eDNA (environmental DNA) and acoustic surveying (for species such as bats).

Whole Systems Picture

NCEA will transform environmental decision making in England through generating a **'whole system' picture** of the state of our natural environment and relating it to the services and benefits that we gain from it as a society – something not currently possible using existing, fragmented data.

The programme aims to assess all elements of our natural capital to the same timescale, the same quality, and the same spatial scale. This **whole-system approach** enables us to efficiently and reliably quantify how natural assets and flows of ecosystem services inter-relate, depend on ecosystem health, and how that health is altered by pressures and interventions.

The true value of NCEA's outputs can be realised when they are **used in combination** to provide a comprehensive picture of the state of our natural environment.

England Ecosystem Survey (EES)



Description

The EES is the largest field survey ever undertaken in the UK. Surveyors are working at thousands of sites on a 5-year survey to collect information on soils, vegetation, and landscape change across the country. The results will allow us to make national-scale assessments on the state of these vital resources, and their ability to keep underpinning ecosystem services like food production and biodiversity.

EES differs from other surveys not just in its scale, but also in the wide range of landscape types it covers; from protected sites and priority habitats to farmland and urban-edge habitats. It will enable us to draw comparisons between these land use types and across the country.

Granularity

England – a national baseline followed by regional data across 14 geographies over the five year survey.

NCEA Contribution

A new ecological survey fully funded, designed and delivered by NCEA through Natural England, with support from RBG Kew.

Availability

Data will begin to be made available from 2025, with the full data set available after completing the five year survey. The data will contribute to a comprehensive and robust baseline for soil health by 2028.



Technical Summary:

Data on ecosystems and landscape is often of variable quality, expensive to collect, difficult to access, and out of date. The EES has set up a long-term monitoring capability at a national/regional level.

EES collects professional survey data to assess state, condition and location of our natural capital assets. The survey takes place within 1km² squares. Over a five-year cycle ecological surveyors are aiming to survey 2500 of these squares, spending up to a week at a time in each one. There they record information on plants, habitats, hedgerows, streams and rivers, trees outside of woodlands, ponds, landscape, and soils.

EES is taking a range of vegetation measurements along with at least 24 different measurements in soil ranging from chemical, physical and biological parameters, as well as eDNA in ponds. Samples are also sent to the Royal Botanic Gardens Kew so mycorrhizal (fungus root) networks in the soil – which play an important role in plant nutrition, soil biology, and soil chemistry - can be analysed.

England Ecosystem Survey use case example: E7 Healthy soil indicator

The England Ecosystem Survey (EES) will be the primary data provider for the Environmental Improvement Plan's Outcome Indicator on Healthy soils (E7).

The indicator will use data being gathered by the EES on soil characteristics (physical, chemical and biological) and land use to show how well different soil types are functioning, and thereby contributing to ecosystem services, as a measure of soil health.

The indicator will be published when sufficient data has been collected by the EES.

Table 1. Data ranges (minimum (Min.) and maximum (Max.)) of estimated soil organic matter (SOM), visual evaluation of soil structure (VESS), earthworm count and pH for 67 monads (1×1 km squares) collected during the England Ecosystem Survey.

Broad habitat	SOM (% estimated)		VESS (score)		Earthworm count (number of earthworms)		pH	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Acid grassland	2.8	45.6	1	4.5	0	15	4	5.8
Arable and horticultural	1.4	15.3	1	4.5	0	36	5.6	8.4
Bog	22.2	81.5	1	4	0	8	3.5	4.4
Calcareous grassland	6.5	6.5	1	1.5	2	10	6.1	6.1
Dense scrub	13.9	13.9	1	1.5	2	11	5.6	5.6
Dwarf shrub heath	53.8	53.8	1	4	0	0	4	4
Fen, marsh and swamp	22.2	22.2	1	1	0	0	6.2	6.2
Improved grassland	2.1	70.2	1	5	0	76	4.5	7.7
Mosaic	15.3	24.8	1	2	0	8	3.8	4.9
Neutral grassland	2.8	44	1	5	0	34	4.8	6.9
Tall herbs	5.7	5.7	1.5	1.5	11	13	7.1	7.1

Note that this is an incomplete and pre-experimental dataset to be used as indicative of approach only. The data have been only partially cleaned and have only received provisional assurance from the NCEA programme to be used for illustrative purposes. In this instance, due to data unavailability SOM (%) was estimated from Total Organic Carbon content using the standard conversion factor of 1.72 (van Bemmelen 1890).



Healthy soils are critical for the delivery of ecosystem services such as food production, water regulation, biodiversity support, and carbon storage. The 25 Year Environment Plan (25YEP) acknowledges this significance by including 'soil health' as one of 66 indicators of environmental change in the Outcome Indicator Framework (OIF)

England Ecosystem Survey use case example: E7 Healthy soil indicator

The England Ecosystem Survey (EES) will be the primary data source of data for the Environmental Improvement Plan (EIP) Outcome Indicator for Healthy soils (E7) through its strategic sample soils data collection.

Problem:

The Environment Agency's 'State of the Environment Report' (2019) indicated that soil health in England faces several pressures such as compaction, erosion, and agricultural intensification. Improving soil health offers a multitude of benefits, including increased agricultural yields, reduced flooding risks, mitigating climate change and maintaining biodiversity. Effective soil management requires the ability to measure and track changes in its health over time. However, assessing soil health presents a significant challenge due to its complex nature, encompassing physical, chemical, and biological properties. England's soils also boast a diverse range of soil types, climates, and land uses.

Solution:

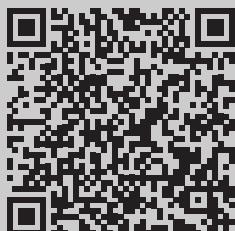
A standardised national soil health indicator will enable comprehensive monitoring, informed land management, effective communication, objective measurement, and streamlined data collection. In June 2023, JNCC published a proof-of-concept study that proposed a framework for assessing and conveying soil health at the field level (Harris et al., 2023). The development of the 25 Year Environment Plan Outcome Indicator Framework E7 indicator will build on this work, adapting it for application at a national scale, with the ability to display soil health for different soil types and land uses.

How does NCEA contribute?

NCEA has developed and is implementing standard procedures for consistent data collection across different habitats, soil types, and land use, which will allow the programme to contribute towards a robust baseline for soil health by 2029, in line with Defra's EIP commitment. Data ranges for selected soil parameters collected by EES were published in an E7 progress report in April 2024 to demonstrate progress towards developing a national soil health indicator.

Policy impact:

This work supports 'Goal 6 Using Resources from Nature Sustainably' and specifically improving and protecting soil health in the Government's Environment Improvement Plan.



Living England Habitat map



Description

Living England 2022-23 is a national habitat map indicating the extent and distribution of England's diverse habitats. This dataset is a modelled output, created using a combination of satellite imagery, geo-environmental data and extensive field survey data. It shows predicted broad habitat types present across England in 2022-23, aligned to the UK Biodiversity Action Plan (UKBAP) habitat classification framework. The next iteration of the Living England map will include a change detection aspect, and is expected to be published in late 2026, utilising the latest satellite imagery and field data. The Living England map has been used to produce other NCEA products such as the Green Infrastructure map and the Priority Habitats Inventory.

Granularity

Minimum area detected 300 m²

NCEA Contribution

Living England has been developed by the NCEA programme and delivered by Natural England. It receives additional funding from the Greener Farming and Fisheries programme.

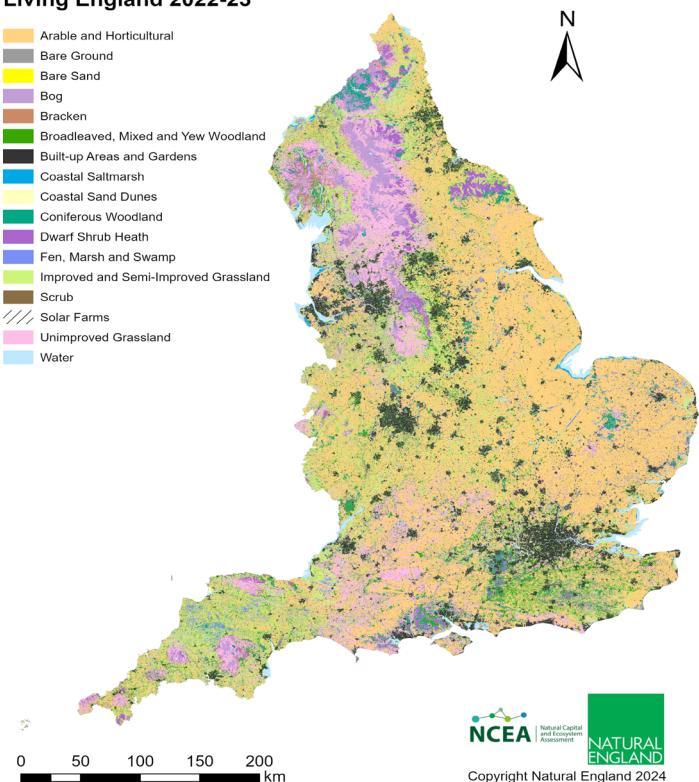
Technical Summary:

Living England uses a 'GeoAI' approach to map habitats across England. This involves using satellite imagery, environmental data and habitat data acquired from targeted field surveys to train and validate a machine learning model (a type of AI). Image segmentation and an object-based image classification approach are employed to delineate and classify more than 13 million homogenous segments of habitat across the whole of England.

The satellite and environmental datasets used include; Sentinel-1 (S1) SAR and Sentinel-2 (S2) Optical data, LiDAR (Light Detection and Ranging) topographic data, computed S1 coherence, backscatter and LiDAR texture indices, proximity distances to OS features, climatic data, and soil data. Certain habitats (bare ground, coastal, and water) are classified using alternative, bespoke methods where good quality data or approaches already exist.

Living England 2022-23

- Arable and Horticultural
- Bare Ground
- Bare Sand
- Bog
- Bracken
- Broadleaved, Mixed and Yew Woodland
- Built-up Areas and Gardens
- Coastal Saltmarsh
- Coastal Sand Dunes
- Coniferous Woodland
- Dwarf Shrub Heath
- Fen, Marsh and Swamp
- Improved and Semi-Improved Grassland
- Scrub
- Solar Farms
- Unimproved Grassland
- Water



NCEA | Natural Capital and Ecosystem Assessment
NATIONAL ENGLAND
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All data is published under OGL and is available to download - please scan the QR code. Supporting methods scripts are available via Natural England's public GitHub page.



Living England use case example: DigVentures



DigVentures are collaborating with citizen scientists through their Deep Time platform to create habitat maps from earth observation data as a pilot for the NCEA citizen science project. This uses earth observation data processed by the Living England project and results are validated by comparison to Living England field survey data.

"Living England's expertise has been instrumental in developing our habitat mapping platform. Their support has enabled us to seamlessly integrate people, data, and technology, empowering communities and landowners to gather crucial environmental data, adopt natural capital approaches, drive landscape regeneration, and tackle climate change challenges head-on." Dr Brendon Wilkins, DigVentures

Problem:

Citizen scientists collect valuable biodiversity data; however most is not made nationally available or interoperable for use alongside other information. Reliable citizen science data collection is needed to provide a realistic solution for monitoring landscape-scale ecosystem change.

Solution:

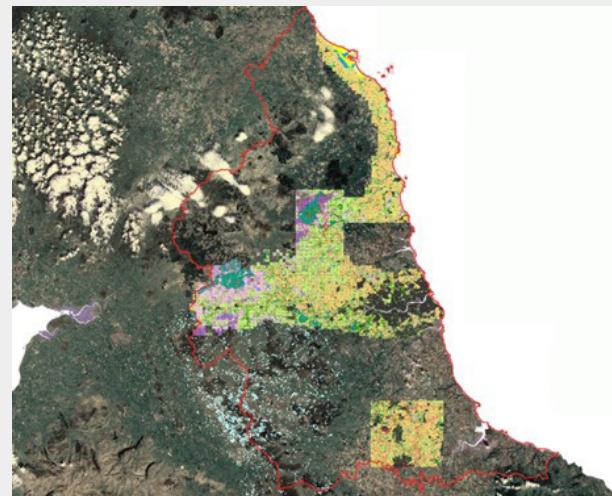
DigVentures ran a pilot of five citizen science 'missions' across Northumbria, delivered via their Deep Time platform. Inexperienced participants were guided through a self-paced online course with live support to identify habitats and environmental features from Earth Observation data. A single-track data validation process was used within the participant cohort, before final data Quality Assessment by the project teams. Landscape collaboration partners included: North Pennines National Landscape, Northumberland Wildlife Trust, Durham Wildlife Trust, the National Trust and Northumberland Coast National Landscape. The project attracted 1,200 applicants from 32 countries, with 489 participants aged 17 to 89 completing training. Approx. 9000 person-hours were spent helping identify and record 46,000 habitat polygons across 4,800 km² of Northumberland in just 5 months. 91% of participants reported they were inspired to make further daily changes to positively impact the environment because of their participation and 68% reported feeling an increased connection to the mission study areas through their contribution.

Policy impact:

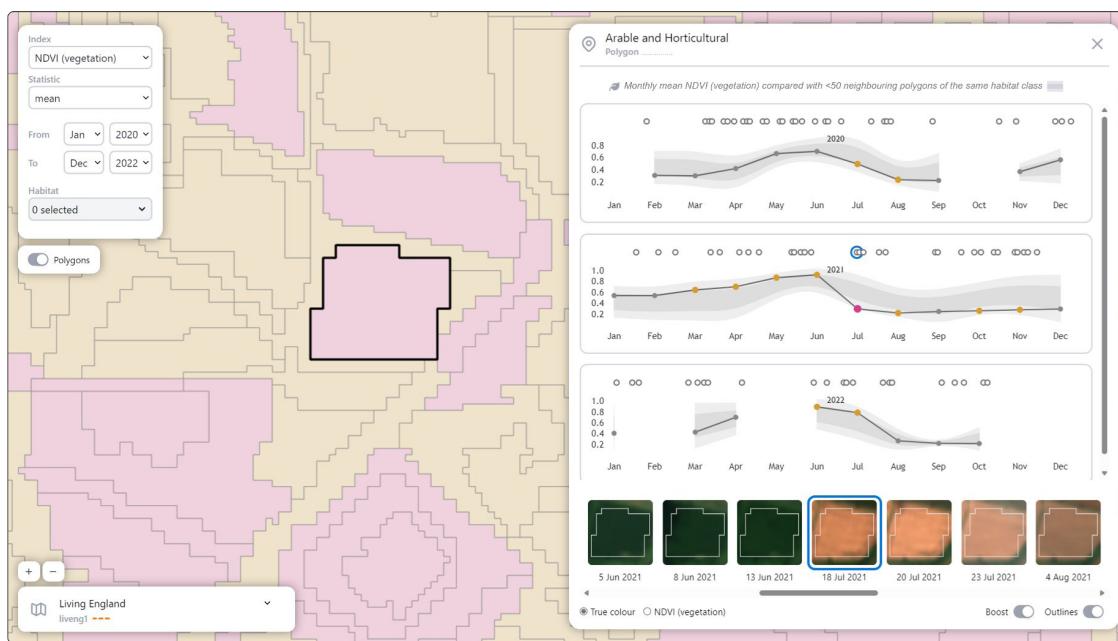
Biodiversity policy relevant to OIF D2, G: Natural Beauty and Engagement/EIP Goal 10

NCEA product benefit:

Living England provided Sentinel-2 seasonal mosaics (processed satellite data) to inform mission analysis, advice on use of other data such as LiDAR derived canopy height model, shared field protocols for collection specific to earth observation validation, and habitat guides and technical reports. Habitat mapping from earth observation data was a new venture for DigVentures so Living England also provided some technical expertise to help them get started.



Earth Observation Habitat Condition Change Detection



Description

JNCC's earth observation-based Habitat Condition Change Detection project aims to detect changes in key characteristics of habitats from regularly captured satellite data. Habitat mapping from satellite imagery is well established but evidence on how the condition of those habitats is changing over time is lacking. Detecting and monitoring habitat change is vital to the evidence base for environmental policy delivery. JNCC are developing workflows and datasets which will support non-specialists to use satellite data to detect changes in key habitat parameters, providing information on aspects of condition change. This will enable more effective targeting and prioritisation of field surveys, and management and restoration activities. This project will support provision of more timely habitat information and may contribute to streamlining monitoring and tracking outcomes from land management decisions.

Granularity

Individual index layers; 10m². Derived statistics; habitat parcels as defined by Living England (minimum mapping unit 300m²)

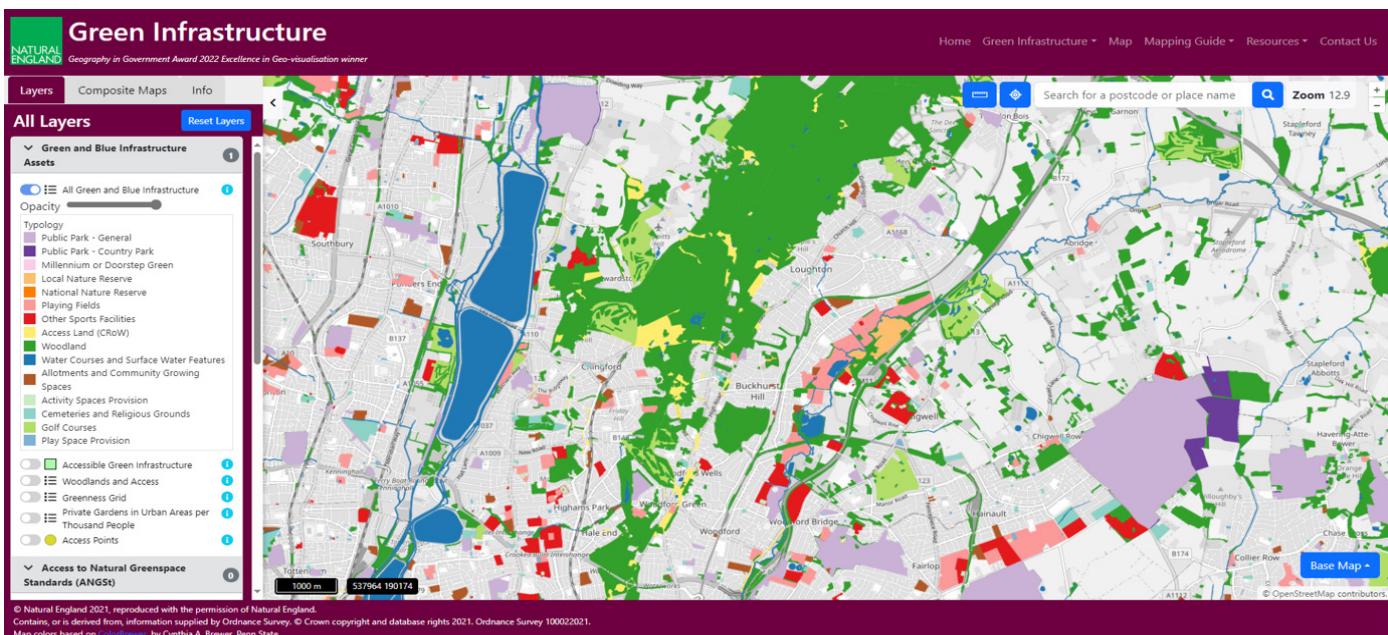
NCEA Contribution

Fully funded, designed and delivered by NCEA through JNCC.

Technical Summary:

JNCC have developed workflows and datasets which analyse multi-year time-series of data derived from the Copernicus Sentinel-1 (synthetic aperture radar) and Sentinel-2 (multispectral optical) satellites. Indices generated from these data characterise factors including vegetation productivity, moisture content, structure, burn severity, and the presence of surface water, on a month-by-month basis. Datasets for each of these indices, known as 'index layers', will be made available. Additionally, the indices are summarised to the level of Living England (LE) habitat segments, producing a set of statistics which can be used to detect changes in aspects of condition within habitat types. The potential uses of the data are being explored through several use case studies, including how they may provide insights on habitat condition change. Testing with site and habitat experts at Natural England, Historic Environment Scotland, NatureScot, Natural Resources Wales and the Northern Ireland Environment Agency has shown how the data can be used to detect gross changes such as tree felling, flooding and upland wildfires, as well as subtle changes such as the impacts of management activities.

Green Infrastructure Mapping



Description

The England Green Infrastructure Mapping database is designed to provide technical evidence on the Green Infrastructure of England as an open data product.

It combines social and environmental data to provide evidence on access to green and blue spaces. The evidence supports the Green Infrastructure Framework, a commitment in the Government's 25 Year Environment Plan.

Granularity

Capable of providing information at multiple scales from England wide, Upper and Lower Tier Local Authority, Middle Super Output Area (MSOA) and Lower Super Output Area (LSOA). The (non-published) data for the Urban Habitat maps has a minimum mapping unit of 5 m². Data is also presented in a range of National Grid aligned grid squares at 250 m or 1 km² resolution.

NCEA Contribution

The NCEA funded the development of some map layers for the 2023 V1.2 database release. For the 2024 Version funding from NCEA has been used to generate updates using data from the 2021 census and undertake the Urban Habitat and Naturalness Mapping development.

Technical Summary:

The Green Infrastructure mapping provides an England level database of evidence to support the understanding or adoption of and monitoring of the Headline Standards within the England Green Infrastructure Standards Framework (Accessible Greenspaces, Urban Nature Recovery, Urban Greening and Urban Trees). The mapping provides baseline information on the location of Green and Blue Infrastructure assets, their public accessibility, and inequalities in their distribution using approximately 120 map layers. Version 2.1 incorporates data from the 2021 census, and new thematic information such as urban habitat and naturalness mapping, urban heat management, urban air quality management and urban food production.

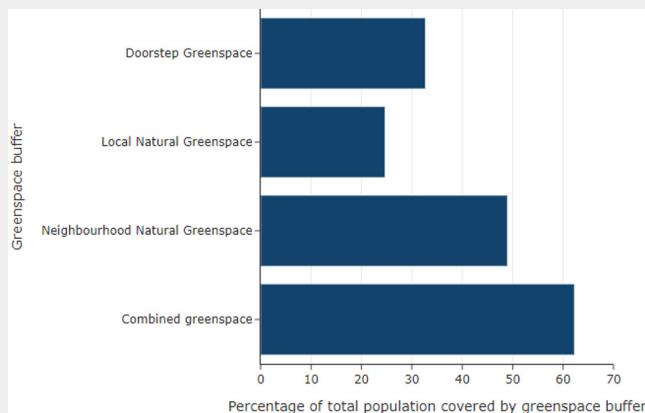


Green Infrastructure Map
(naturalengland.org.uk)

Green Infrastructure Map use case example: Outcome Indicator Framework G3a: Enhancement of green and blue infrastructure



The Green Infrastructure Map is combined with the census population to calculate the G3a interim indicator for the percentage of the total population in England living in close proximity of greenspace.



"This indicator will show changes in the quantity, quality, accessibility and, ultimately, multiple functions of green and blue infrastructure. Green and blue spaces and other natural features in and around our built environment, including within Green Belts, are part of networks of multi-functional green infrastructure, which can deliver a wide range of benefits that are essential to health and well-being, nature, climate, water and prosperity." Defra Outcome Indicator Framework (OIF) Team

"Green Infrastructure Map data is combined with census data to calculate the percentage of the population living within three different Greenspace categories as well as a combined greenspace category which brings together all three" Defra OIF Team

Problem:

Green infrastructure includes land, freshwater and coastal spaces. Green and blue spaces and other natural features in and around the built environment, including within Green Belts, are part of networks of multi-functional green infrastructure. These networks can deliver a wide range of benefits that are essential to health and well-being, nature, climate, water and prosperity but there hasn't been the data/tools to compare these spaces with the population. The G3 'Enhancement of green and blue infrastructure' indicator will show changes in the quantity, quality, accessibility and, ultimately, multiple functions of green and blue infrastructure.

Solution:

The OIF interim indicator has three components, one of which is G3a: Percentage of the total population in England living in close proximity of greenspace, as of October 2021 to May 2025. The Green Infrastructure Map green and blue spaces is combined with the census population lower layer super output area (LSOA) to calculate G3a interim indicators for Doorstep Greenspace (0.5 ha within a 200m); Local Greenspace (2 ha within a 300m); and Neighbourhood Greenspace (10 ha within 1km). The combined greenspace category includes the percentage of the population living within the above three sub-categories.

How does NCEA contribute?

NCEA funded contributions to the Green Infrastructure map which have enabled the Defra OIF team to perform this important comparison of green and blue spaces and the population.

Policy impact:

The Green Infrastructure map contributes and enables Outcome Indicator Framework 25 Year Environment Plan targets for 'Enhancing beauty, heritage and engagement with the natural environment' and European Landscape Convention's UN SDG 11: 'Make cities and human settlements inclusive, safe, resilient and sustainable'.

Botanical Value Map



Description

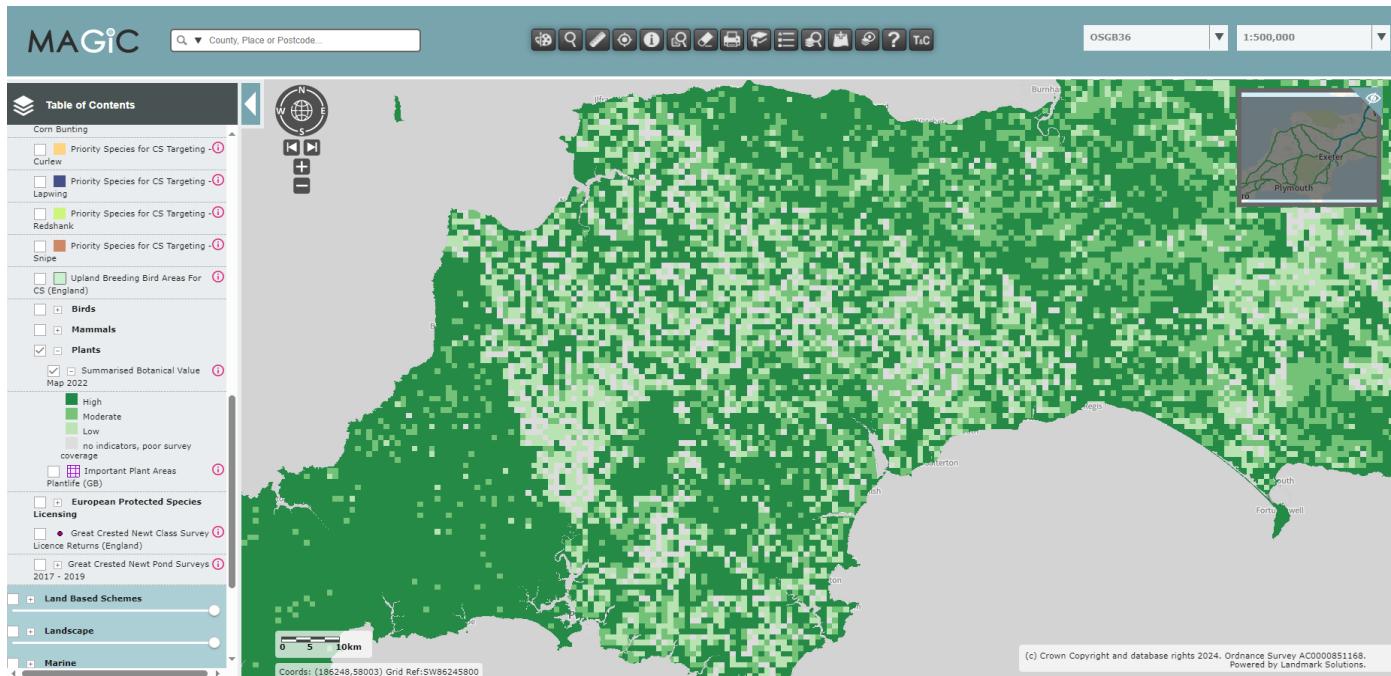
Natural England and the Botanical Society of Britain and Ireland (BSBI) have been working in partnership to use BSBI's vast database of plant records to inform the evidence base for tree-planting activities. This value map provides an easily interpretable output to help inform land management decision-making - such as strategic planning on a landscape scale of tree planting - and other nature recovery activities. This map is not intended to be used to carry out detailed assessments of individual site suitability for tree planting. However, the summarised Botanical Value Map can provide useful insights at a strategic landscape scale to highlight monads (1km² of land) of high value for vascular plants, inform spatial planning and prioritisation, and other land management decision-making. These should be used alongside other environmental datasets and local knowledge to ensure decisions are supported by the appropriate evidence.

Granularity

1 km² (but considers neighbouring 25km)

NCEA Contribution

Funded by NCEA derived from BSBI plant occurrence records



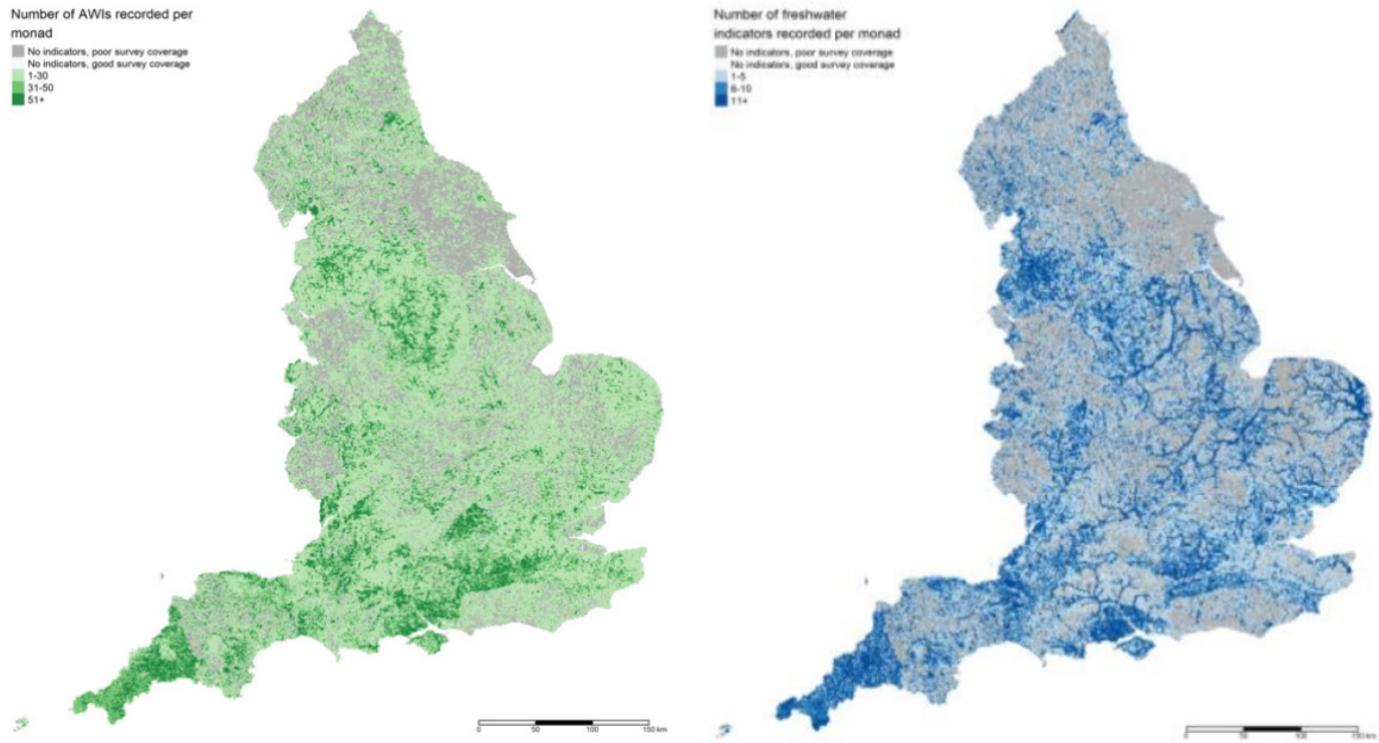
Technical Summary:

This value map categorised monads (1 km²) as being of Low, Moderate or High botanical value according to Botanical Heatmaps Technical Report 5, the presence of RST species (nationally Rare or Scarce and Threatened according to Vascular Plant Red Data List for Great Britain) and/or the proportion of Priority Habitat Positive Indicators (PHPI) species present in the surrounding areas (within 25km).



Summarised Botanical Value Map is published under AGOL and available to download.

Botanical Heatmaps



Description

The botanical heatmaps summarise occurrence records of plant species whose presence are likely to be strongly indicative of the presence of semi-natural habitats of high wildlife value. Restricted license applies.

Granularity

100m²

NCEA Contribution

Fully funded, designed and delivered by NCEA through Natural England.

Technical Summary:

The Botanical Heatmaps show the number of nationally Rare, Scarce and Threatened (RST) and Priority Habitat Positive Indicators (PHPIs) recorded as present in 100m² and 1 x 1 km (monad) grid cells in England between 1970-2023 for ten broad habitats: Arable; Boundary; Coastal; Fen, Marsh & Swamp; Freshwater; Grassland; Heath & Bog; Inland Rock; Montane; and Woodland. These species were chosen for heatmapping as their locations are likely to indicate areas of good quality semi-natural habitat and therefore areas to be avoided by potentially damaging activities such as tree-planting.



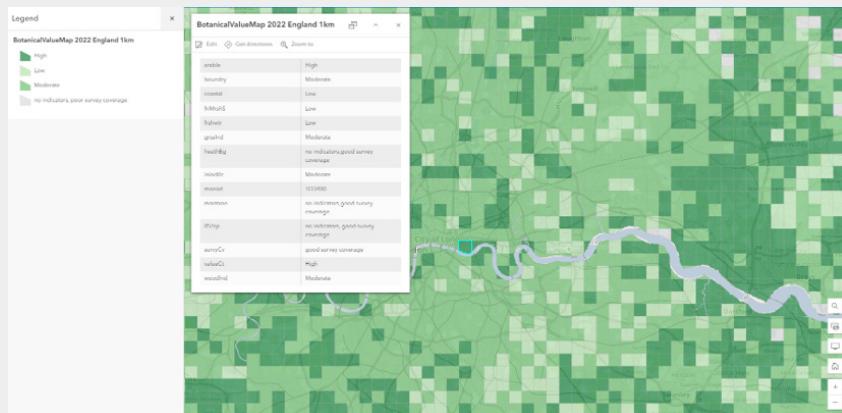
Botanical Heatmaps and the
Summarised Botanical Value Map
Technical Report

Due to the sensitive nature of some of these data, these layers will only be made available for conservation purposes under more restrictive licensing. Requests to access these data should be made to Natural England by emailing botanicalheatmaps@naturalengland.org.uk

Botanical Heatmaps and Value Map use case example: Tree planting



The Botanical Heatmaps and Summarised Botanical Value Maps use data collected by volunteers to help identify areas of high botanical value. By doing so, they help to ensure such areas are properly considered and protected when making land management decisions, including tree planting schemes. and protected when making land management decisions, including tree planting schemes.



"These [Botanical Value] maps will help landowners to see if their land is likely to have open habitats of interest that should not be planted on. These might include species-rich grassland or blanket bog with deep peat." Kevin Walker, BSBI

"1.21. Improve the Forestry Commission's woodland creation map to better show low-risk areas for woodland creation incorporating additional sensitivities as new information becomes available" - The England Trees Action Plan 2021-24 May 2021

Natural England teams are using the Botanical Heatmaps Value Maps to detect the presence of Rare, Threatened, and Scarce species and habitats to prevent inappropriate afforestation ahead of field surveys.

Problem:

The Forestry Commission (FC) needs to balance economic and environmental priorities while meeting regulatory requirements. Afforestation should, as a minimum, result in no net loss of biodiversity. Afforestation means conversion of a non-woodland land use, for example agriculture, into woodland by means of planting, or facilitating natural regeneration of trees. The types of projects that may need to apply for afforestation are grant applications, development-related proposals, permitted development, and afforestation proposals over 0.5 ha.

Solution:

FC requires an Environmental Impact Assessment (EIA) to understand whether a project is likely to have a significant effect on the environment. If sensitivity mapping carried out for the EIA indicates priority habitats listed as 'high sensitivity' on Opportunity Maps and maps of 'Low Risk areas' then landowners need to apply to FC for consent. Afforestation has different risks based on size of plantation. There is a general presumption against afforestation of non-wooded Section 41 priority habitats. Other reasons include existing heritage features. Afforestation has different risks based on size of plantation.

How does NCEA contribute?

The Botanical Heatmaps can be combined with the other maps on the FC's Map Browser and Land Information Search which can support the production of an Environment Statement to provide the FC and other interested parties with as full an understanding of the consequences of the proposals as possible.

Policy impact:

This supports the aims of the Environmental Improvement Plan Goal 6, Environmental Land Management schemes with tree planting, and Biodiversity D3/4/5 and E5.

Local Nature Recovery Strategy (LNRS) National Habitat Map and Data Viewer



Description

ArcGIS Online web-based mapping portal provides Local Nature Recovery Strategy 'responsible authorities' with viewing and download access to National Habitat Map and Section 107(5) & 107(6) data published on existing Defra group sites (such as Data Sharing Platform, MAGIC, NE Download Site, etc.) as well as LNRS guidance material, etc. This promotes better join up and easier access to habitats data.

Granularity

Different granularity for each of the datasets supplied.

NCEA Contribution

Fully funded, designed and delivered by NCEA through Natural England.



National Habitat Map - LNRS
Data Viewer (arcgis.com)

National Habitat Network Maps



Description

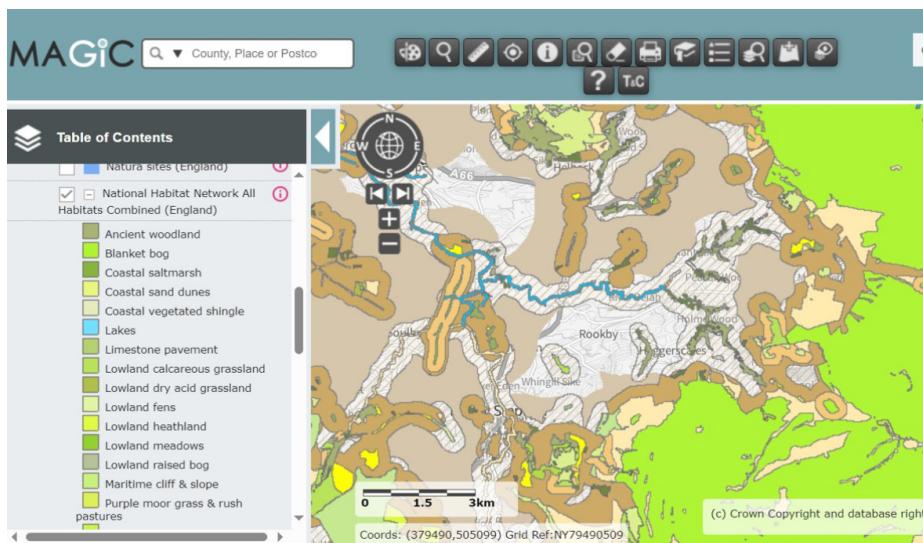
The habitat network maps show the spatial orientation and proximity of habitat patches and how they form an ecological network. They aim to identify enhancement zones to prioritise habitat restoration and creation which would reduce fragmentation and improve network resilience by expanding and connecting existing habitat. They are being used in Agri-environment scheme targeting, in the development of Local Nature Recovery Strategies, helping to identify suitable locations for habitat creation and restoration. They may also be used for identifying strategic areas for Biodiversity Net Gain investments and management planning for National Parks and AONB's.

Granularity

25 m²

NCEA Contribution

Developed in 2019, updated work and outputs fully funded by NCEA



Habitat Network Map

Technical Summary:

Habitat network maps for 23 habitats as well as a combined habitat network map. The habitat maps are aggregated into grouped Habitat Networks Maps for coastal, lowland grasslands, lowland wetland, and upland habitats. The Ancient Woodland Network Map is built around the Ancient Woodland Inventory (AWI).

Under the NCEA Opportunity Mapping work stream additional work has been undertaken to supplement the Habitat Network Maps by the production of Habitat & Ecosystem Potential Maps (map that identify locations suitable for restoring habitats and ecosystems) and the Habitat Creation Spatial Audit (an audit of locations where habitat creation and restoration has already taken place). In addition, work has been underway to develop a map to identify Floodplain Wetland Mosaics (a new wildlife-rich habitat to replace coastal and floodplain grazing marsh) which will be used to update the Priority Habitat Inventory. Additional habitat network maps will also be developed for floodplain wetland mosaics and the woodland network map has also been revised to cover all deciduous woodland.

All outputs from the Opportunity Mapping work stream will be used to update the Habitat Network Maps.

Habitat Network Map use case example: Agile nature recovery and Nature Based Solutions opportunity maps

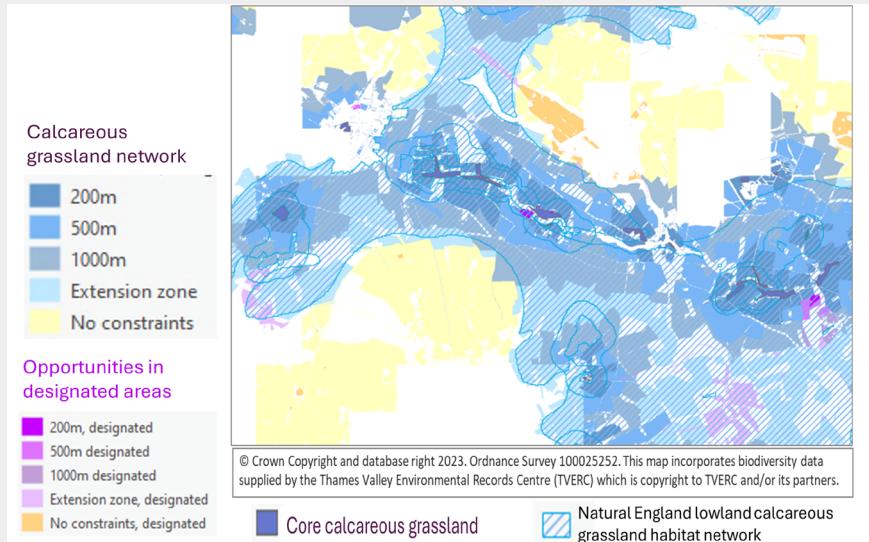


Natural England's current Habitat Network Maps have been used for habitat opportunities in Oxford university's Nature Based Solutions (NBS) maps.

The NBS maps provide the following information:

- Habitat
- Scores from 0 to 10 for 18 ecosystem services, and biodiversity
- Estimates of carbon stored and sequestered per ha
- Opportunities for nature recovery and nature-based solutions

"The NE habitat networks were invaluable for mapping opportunities to link core habitat patches together as an 'extension' beyond our 1km buffer zones." Alison Smith - Senior Research Associate



Problem:

To scale-up high-quality nature-based solutions in England, stakeholders need open access habitat maps for baselining, finding areas currently delivering high ecosystem services, and finding opportunities for enhancements.

Solution:

The Agile Initiative is a five-year programme based at the Oxford Martin School which aims to respond to specific social and environmental policy questions with fast-paced solution-focused 'Sprints' that deliver demand-led new research. The NBS sprint includes mapping NBS and nature recovery opportunities, as well as guidance on governance, funding and monitoring NBS, with a map of case study examples. We have developed open-source software to create maps of opportunities for NBS and nature recovery options in England. The maps show areas which are potentially suitable for specific types of interventions, such as creating woodlands, grasslands, wetlands and ponds, and restoring peatlands, based on a series of simple rules. They are intended to encourage the sighting of interventions in the most suitable locations to maximise benefits and minimise trade-offs.

How does NCEA contribute?

The Habitat Network Map was used to identify areas for nature recovery opportunities within woodland, grassland, heathland and wetland zoned distances from core habitat patches (200m, 500m, 1km, or over 1km but within the Natural England Nature recovery network for that habitat). Other datasets used are Priority Habitat Inventory, CROME, OS Greenspace, and ALC.

Policy impact:

Nature Recovery Networks, LRNS, OIF D1.

Priority Habitat Inventory



Description

The Priority Habitat Inventory is a spatial dataset that maps the geographic location and extent of terrestrial priority habitats in England.

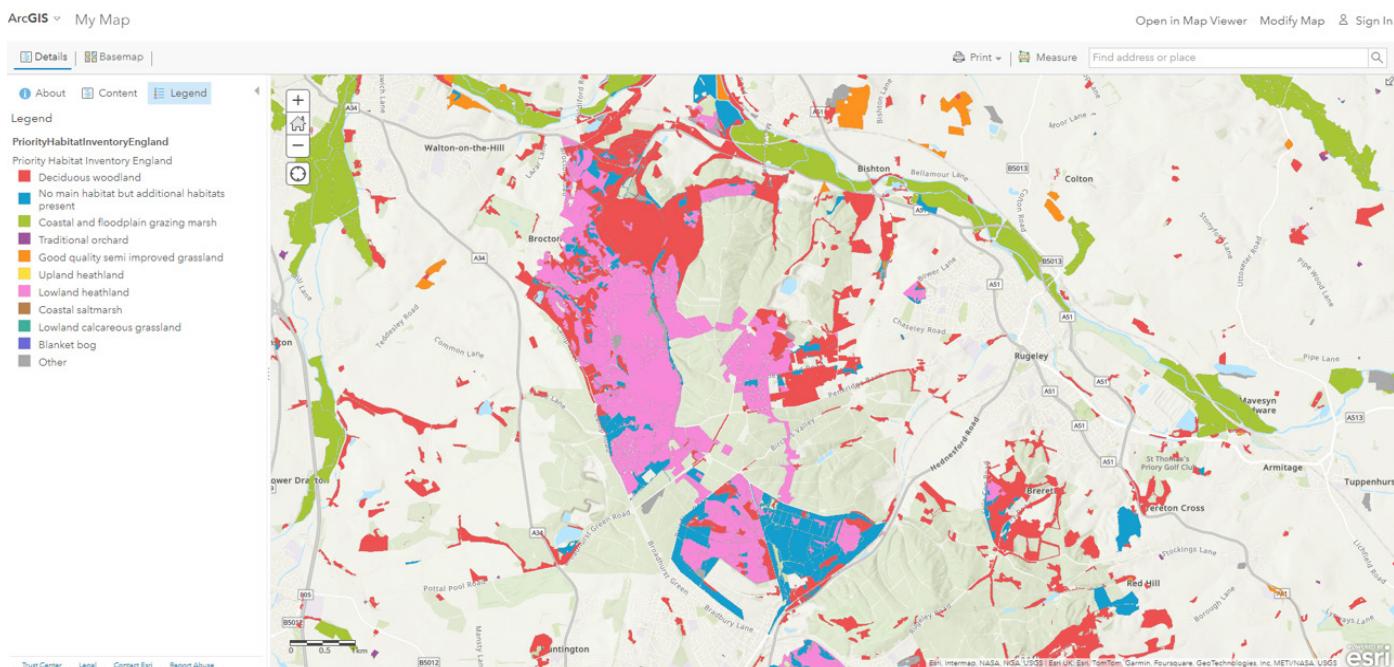
These habitats are amongst those identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP), and of principal importance for the conservation of biodiversity under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Updated bi-annually.

Granularity

OS Master Map is used as the spatial framework from which this mapping is based.

NCEA Contribution

As an existing dataset the NCEA supported improvements to ensure the inventory is updated, of good quality, and that it is easier to update through automation of processes.



Technical Summary:

This is a spatial dataset that describes the geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance.

This replaces Natural England's previous separate BAP habitat inventories. There are 26 (terrestrial) Priority Habitats in England, that includes all data amendments and additional partner and independent inventories. They map overlapping habitats and additional qualifying information to the habitat classes.

Priority Habitats Inventory

Mycorrhizal Diversity Dataset & Metrics for England

Royal Botanic Gardens
Kew

Description

A mycorrhiza is a symbiotic association between a fungus and a plant root, which plays an important role in plant nutrition, soil biology, and soil chemistry. There are many gaps in our knowledge of the diversity, abundance, and influence of mycorrhizal fungi in UK ecosystems. This project addresses these knowledge gaps by integrating mycorrhizal research into NCEA's national soil monitoring efforts across diverse habitats. It builds on the research and method development carried out in Kew's 'Nature Unlocked' programme at Wakehurst where mycorrhizal data is collected alongside below and aboveground carbon data. This enables us to understand the influence of mycorrhizal communities on carbon storage across specific habitat types.

Granularity

Resolution will be either national or regional and will be confirmed later this year, dependant on data provision.

NCEA Contribution

Project fully funded by NCEA and delivered by RBG Kew in partnership with Natural England through EES soil monitoring work, and with Forest Research through NFI+ Soil Condition surveys.

Technical Summary:

RBG Kew will generate belowground baseline diversity data for mycorrhizal fungi (mycorrhizal types, community composition) across multiple habitat types in England. This below ground biological information will be integrated with other variables measured as part of the NCEA's national-scale monitoring effort, such as carbon stocks, soil chemistry and vegetation, providing data to link below and above ground ecosystem functioning across different land uses and vegetation types. This will help to elucidate the role of mycorrhizal fungi in carbon stocks and nutrient cycling.

The dataset generated will be used to select mycorrhizal fungi that can be novel indicators of soil health for understanding ecosystem service delivery and resilience. This innovation will contribute a key but so far neglected variable in soil assessment and monitoring, to expand and enhance NCEA's soil monitoring efforts and could improve policy decision-making for land management, conservation, and habitat prioritisation.



Images from R-L: Ectomycorrhizas under the microscope and the Kew team in the lab



NCEA Mycorrhizas
Data due to be published in 2025 (soil samples & veg data from EES & NFI+).
Data collection began in Autumn 2022.

England Peat Map



Description

The new England Peat Map will help achieve high impact strategic restoration, and help determine the mitigation of greenhouse gas emissions, and provide other ecosystem services.

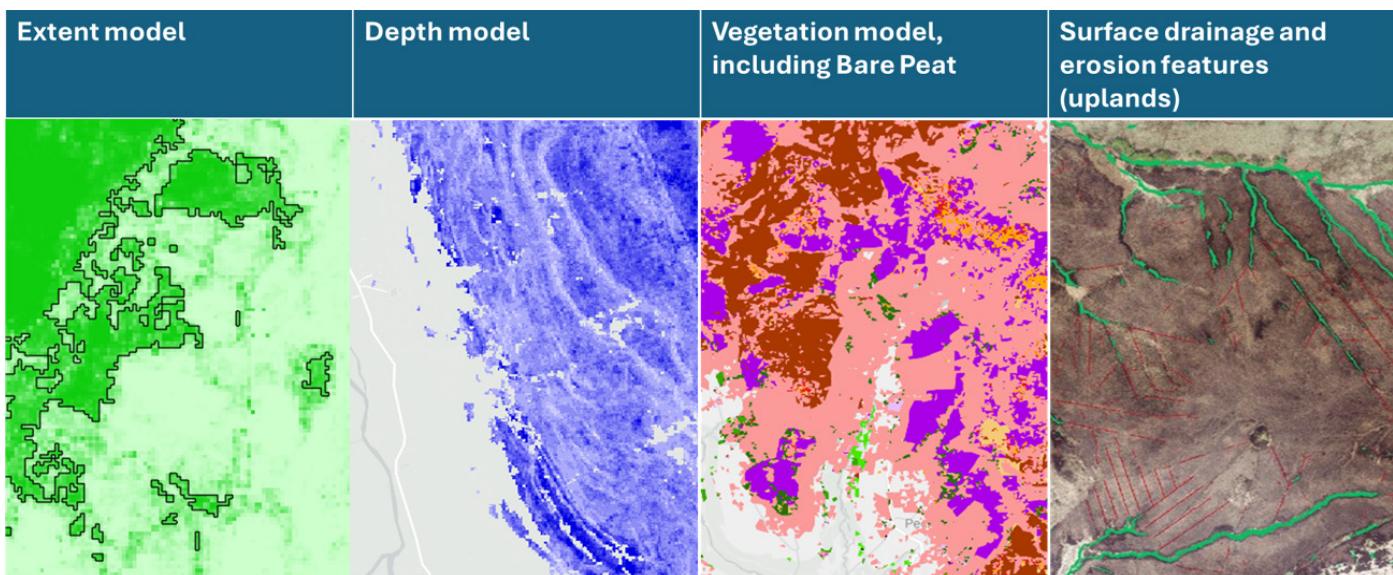
There was a lack of comprehensive data in this area with only basic evidence of known quality and quantity. This map integrates existing dispersed data and collection of new field survey data to provide national models of peat extent, depth and condition.

Granularity

A map of probable peat extent: 10 m. Peat depth: 10 m. Vegetation: 10 m. Bare peat: 25 cm. Surface features (grips and gullies): 12.5 cm.
Note: surface features are produced through AI4Peat, not directly through NCEA.

NCEA Contribution

Co-funded by NCEA and Nature for Climate Fund, and delivered by Natural England. England Peat Map supports the AI4Peat project.



Technical Summary:

England Peat Map is the most complete map of England's peatlands and peaty soils to date. It models the extent, depth, and aspects of condition of our peat, including vegetation and surface features like grips and gullies (man-made and natural drainage channels).

Peaty soil extent, depth and vegetation are determined through quality assured ground surveys to train AI interpretation of a range of datasets, including:

- LiDAR topography
- Earth observation satellite data (both optical and radar)
- aerial photography
- geology
- flooding
- land utilisation
- landscape classification

The map can also be accessed from Defra's Data Services Platform (DSP).



Published May 2025,
interim reports published
December 2023 (limited
access for stakeholder
feedback)



England Peat Map is
available on DSP

England Peat Map use case example: Peat Burning



The England Peat Map project is delivering the aim of the England Peat Action Plan to produce detailed mapping of peatland. The map may be used by land managers and the Fire and Rescue Services for inclusion in wildfire management planning, and to help tackle emergencies.

"There have been a number of peatland wildfires across the UK this year which have resulted in damage to habitat, carbon emissions and potential human health concerns from the resulting air pollution."
Emma Goodyer, Manager of IUCN UK Peatland Programme

"We will continue to protect our peat from fire by both phasing out managed burning and reducing the risk of wildfire."

—England Peat Action Plan May 2021

Problem:

When assessing wildfire severity, an important factor is fuel load. Once established, a wildfire can recruit further fuel load by heating and drying out material that would otherwise not have burned.

Solution:

The Heather and Grass Burning in England Regulations 2021 introduced the requirement for a license to burn vegetation on areas of peat deeper than 40 cm that are also within a designated site such as Special Areas of Conservation (SAC), Special Protected Areas (SPAs) and Sites of Special Scientific Interest (SSSI). The application for the licence requires a Wildfire Management Plan (WMP) which must provide Defra with sufficient information to be able to undertake a Habitats Regulations Assessment. The Wildfire Checklist for the WMP asks for an assessment of how using fire could damage habitat and soils, including peat, and carbon stocks. It also asks for any rewetting of deep peat that can increase resilience to wildfire.

How does NCEA contribute:

Using the EPM to develop a well-informed WMP should help prevent accidental burning of deep peat, either through poorly informed burning or wildfire spread from controlled burning. The indication of areas of deep peat will also help inform rewetting projects that reduce the risk of wildfire.

Policy Impact:

This supports the Environmental Improvement Plan policy Goal 8: Reduced risk of harm from environmental hazards.

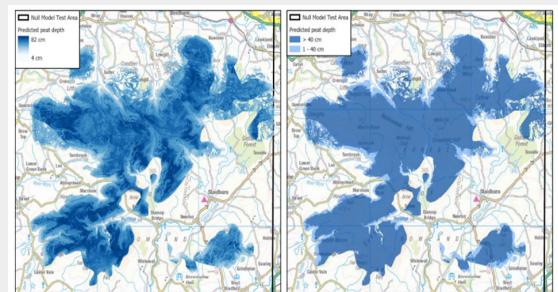
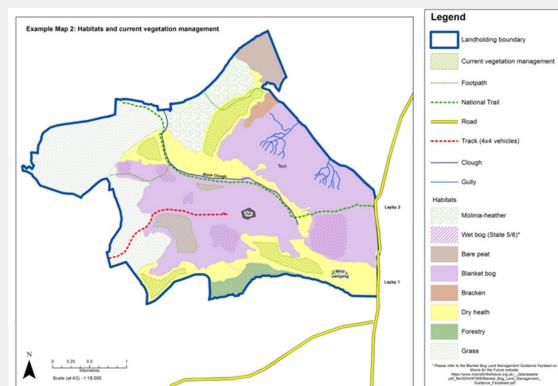


Figure 3: Example null model outputs for peat depth (left) and example showing how this can be classified (right)

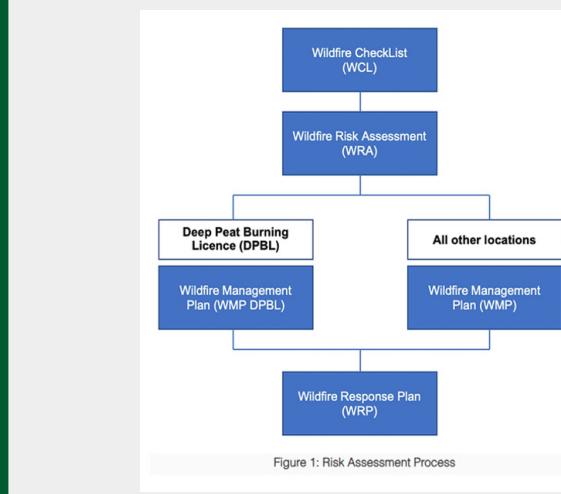


Figure 1: Risk Assessment Process

England Water Environment Monitoring

Description

These surveys, delivered by the EA, comprise of 11 monitoring networks that provide a combined story on water condition across multiple water environments. These will provide key datasets to help interpret the condition of our water environment and how it is changing at a national scale, from source to sea. The networks will provide data across the programme for systems mapping, insights and natural capital location, extent and condition.

Granularity

England – National baseline from 2025 onwards, varying across the networks. The data will contribute to a comprehensive and robust NCEA baseline by 2028. There is possibility for regional baselines to be explored.

NCEA Contribution

Funding for new networks for rivers, small streams, lakes, river temperature, water quantity, atmospheric deposition, estuaries and coasts, groundwater ecology, wetlands, temperature, quantity and quality; some of which utilise data from and build upon existing networks.

Overview of Measurements:

The NCEA programme is delivering a set of national-scale surveillance monitoring networks that will enable us to assess the condition of, and trends for, the water environment over time. These networks are new and intended to complement the EA's pressure-specific local monitoring programmes. In addition, we are exploring innovative techniques including eDNA and acoustic monitoring.

Networks:

- Estuaries & Coasts: Seagrass, saltmarsh, sediment, chemicals, kelp & fish
- Groundwater Ecology: Physical chemistry, water chemistry, faunal sample
- Groundwater Temperature
- Groundwater Wetlands: Chemistry, water level, rainfall, vegetation
- Groundwater Quantity: Water level
- Groundwater Quality: Chemistry (nutrients, inorganic and organic chemicals)
- Water Quantity: River Flow telemetry data
- River Temperature: Temperature telemetry data
- Small Streams: Physical chemistry, invertebrates, macrophytes, eDNA & Habitat Survey
- Lake Surveillance: Physical chemistry, phytoplankton, fish eDNA, macrophytes & habitat
- River Surveillance: Water quality, chemicals, invertebrates, diatoms, macrophytes & Habitat Survey

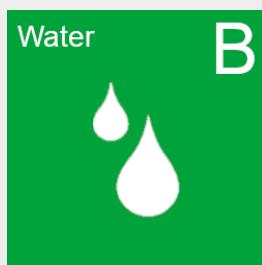
The data and evidence from the new networks will be used across the NCEA programme to inform natural capital metrics and indicators, and included in the 25 YEP/EIP23 reporting on the condition of the water environment in future.



Data collection began in 2023, data will be published gradually over the next few years

Water Environment Survey (Lakes) use case example: B6 Natural functions of water & wetland ecosystems indicator

Lake surveillance, part of the Water Environment Network will contribute additional data to the B6 Natural functions of water and wetland ecosystems indicator to increase the 'representativeness' of the lakes that are assessed. Data on numerous individual attributes, from different sources, feed into the B6 indicator. The data for lakes currently relies on sampling undertaken for the Water Framework Directive (WFD) which is not a representative sample of the lake resource as it includes many protected sites and reservoirs where measures are already implemented to improve water quality. Therefore, it could over-estimate the condition of lakes that are not protected sites or reservoirs and limit the ability to target additional improvement activities.



Indicator components									
B6: Naturalness scores of water and wetland ecosystems									
		Image							
		Table							
Broad Habitat	Habitat Type		Naturalness Components	Hydrological	Physical	Chemical	Biological	Cross-Cutting	Combined Classification
Running Waters	Large Rivers								
Standing Waters	Headwater Streams								
Lakes									
Ponds									

Healthy water habitats are essential for wildlife to thrive. The Environment Act 2021 set an apex target for nature to halt the decline in species abundance by 2030 and the Environment Improvement Plan committed to protecting 30% of our land for nature by 2030. Work to restore the water system is a fundamental part of achieving these goals.

Problem:

Human activity over the last few centuries has modified our water bodies and stopped them from functioning naturally. Some of these modifications can harm ecology so Defra's Plan for Water sets out how the Government will target water bodies where modifications are having the biggest impact on wildlife and are stopping us achieving our biodiversity targets. The assessments currently undertaken as part of the B6 indicator which will support this aim are largely based on data from existing monitoring activities such as WFD monitoring. However, these are not a representative sample of the lake habitat resource as a whole, as it includes many SSSIs and reservoirs, where measures are already implemented to improve water quality.

Solution:

Solution to develop a surveillance network of 480 lakes identified as a representative sample of all the lakes in England which meet agreed criteria using the UK Lakes inventory database to ensure that a more complete unbiased picture of the current condition of lakes is available.

NCEA Product Benefits:

Relevant measurements which will support the assessment of the natural function of lakes for the B6 indicator include water chemistry which can indicate the impacts of a wide range of human activities, plankton diversity and fish environmental DNA (eDNA) which are indicators of good water quality, macrophytes which can be significantly affected by human activities such as recreation, managed modification or nutrient enrichment, which alters the functioning of the lake ecosystem, and the physical habitat which can be affected by human activities or be a natural property of the lake.

Policy Relevance:

This work supports Goal 1 Thriving plants and wildlife and specifically work to restore the water system in Government's Environment Improvement Plan.

The freshwater monitoring network for lakes will increase the data available for the Environmental Improvement Plan (EIP) Outcome Indicator for Natural functions of water and wetland ecosystems (B6) through its strategic sample data collection programme.

England Water Environment Evidence & Insights

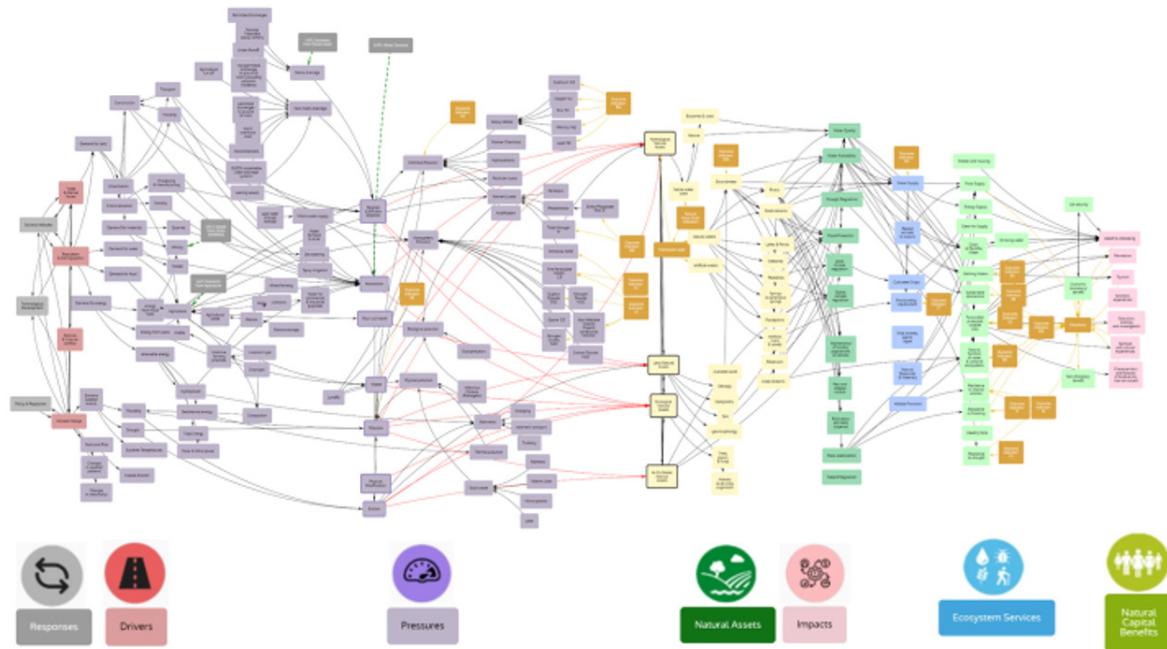
Description

A collection of tools, systems maps, indicators and metrics, analysed data sets, and narratives to provide insight on England's natural water environment to support taking a natural capital approach.

NCEA Contribution

This work is delivered entirely by NCEA.

High Level System – Water



Technical Summary:

Evidence and insights into England's water environment will be achieved through a combination of data analysis, interpretation, and application.

Systems maps: We are developing an improved approach to turn our data and information into real evidence and insights on the condition of our water assets and ecosystems. We are developing a library of sub-systems maps (tackling the whole water system one step at a time) that represent the myriad interacting elements that affect the condition our water assets and the ecosystem services and benefits we derive.

The system maps will represent Pressures (natural and anthropogenic) on; Condition (quantity, quality and location); Impact (e.g. eutrophication or low flow); Ecosystem Services; Ecosystem Benefits and Ecosystem Value. They will also provide users the ability to explore Responses (policy intervention) and Drivers (climate, population and socio-economic). The system maps will link data that currently exists; data from the NCEA monitoring networks; and newly developed natural capital understanding to produce holistic environmental insights.

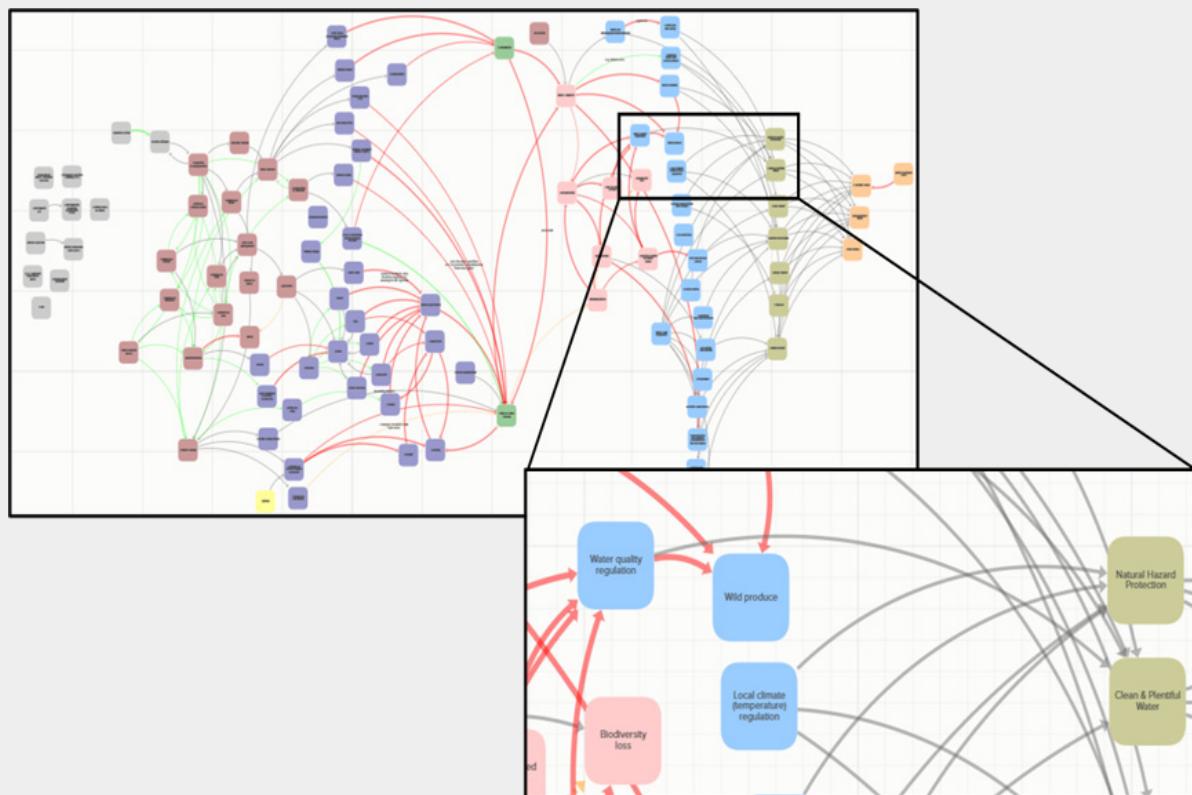
Natural Capital Indicators and Metrics: We are developing an Asset Service Matrix for the freshwater environment to structure and order the relationships and evidence on how natural assets are linked to ecosystem services. This will improve integration of natural capital evidence across business processes to improve outcomes. It will also improve understanding and reporting of the ecosystem services and benefits provided by the water environment that are relevant to key policy areas on nature, climate, health, food security and the economy.

Water Environment Evidence & Insights use case example: Systems maps

We are taking a systems approach to provide holistic and integrated understanding of the myriad interacting factors that affect the condition of our water assets and the services and benefits they provide. The systems understanding will follow a consistent logic: Response, Driver, Pressure, Condition, Impact, Service, Benefit and Value. Indicators and Metrics will help us to provide a 'health check' of different parts of the water system.

Policy makers and environmental specialists will be able to use the maps to understand:

- The current condition of any single part of the system is
- The parts of the system are impacted and the knock-on effects
- How different parts of the system impact on the condition of the asset and the delivery of ecosystem services
- Where and how we monitor/measure to fully understand its changing condition
- Where there may be trade-offs between the ecosystem services we derive from natural assets



Metrics are a critical part of the 25 Year Environment Plan. They enable us to comprehend the complexity of the environment and allow us to:

- understand how the environment as a whole is changing – the pressures, the condition of assets and the flow of benefits
- assess the effectiveness of our policies
- inform decisions and promote action within and outside government, locally and nationally

When we use a natural capital approach, we are more likely to take better and more efficient decisions that can support environmental enhancement and help deliver benefits such as reduced long-term flood risk, increases in wildlife, and a boost to long-term prosperity.

Trees Outside Woodland (TOW) Field Survey



Description

Working at thousands of sites on a 5-year cycle, surveyors are collecting information on small woodlands under 0.5 hectares, groups/lines of trees, lone trees, and hedgerows. This will enable reporting on change in these treescapes across the country. This will be the largest field survey of trees outside of woodland ever undertaken in the UK. The results will allow us to make national-scale assessments of the state of these vital resources and their ability to continue to underpin ecosystem services, as well as previously less well quantified Natural Capital benefits such as carbon stocks, landscape heritage and biodiversity. The TOW survey is compatible with the England Ecosystem Survey (EES), which will also be recording condition data on lone trees and hedgerows in a wide range of landscape types, from protected sites and priority habitats to farmland and urban habitats. It will enable us to draw comparisons between these land use types and across the country.

Granularity

England – a National baseline after a first survey cycle, followed by regional data across 14 geographies

NCEA Contribution

ToW field survey is fully funded, designed and delivered by NCEA through Forest Research

Technical Summary:

Founded on National Forest Inventory (NFI) woodland measurements, this work will allow us to understand the character and condition of trees outside of woodland (not recorded in NFI), and validate the TOW map.

- Tree species
- Tree species diversity
- Age, size, form
- Stand structure
- Tree Health (including presence of rot holes, sap runs)
- Lichens

- Presence of invasive plant species
- Deadwood
- Plant species diversity
- Herbivory

Data will begin to be made available from 2026, with the full data set available after completing the first survey cycle (2500+ sites). The data will contribute to a comprehensive and robust baseline for soil health by 2028.

Trees Outside Woodland (TOW) Map



1km square centered on
South Harting, Petersfield,
Hampshire

Key:
Pink – Lone trees
Yellow/Green - Groups of
trees
Light green – Small woodland



Trees Outside Woodland
map was published in
April 2025 under AGOL.

Description

A national map derived from remotely sensed data to show the location and extent of all trees greater than 3m in height and covering less than 0.5ha in surface area. This is not currently covered within the existing NFI woodland monitoring, which only looks at woodlands greater than 0.5ha. The first iteration of the map will display small woodlands, groups and lines of trees, and lone trees in England. This better mapping of these features represents significant opportunities for localised treescape restoration projects such as those being sought by the Environment wAct, Environmental Land Management, Local Nature Recovery Strategy, and Biodiversity Net Gain.

Granularity

Feature dependent but Minimum
Mapping Unit 5m²

NCEA Contribution

TOW is fully funded, designed and delivered by NCEA
through Forest Research

Technical Summary:

The map combines LiDAR and Aerial Imagery to build a comprehensive national map of lone trees, groups of trees and small woodland that can then be interrogated on a national, regional, local, and feature by feature basis to provide the viewer with details on the extent and location of these features. The product will provide finer details such as the approximate heights, widths and counts of features as it is refined over the course of the programme. The map will be calibrated by GIS hand-mapping and a field survey. The field survey will provide additional metrics on the character and condition of a sample of the TOW features.

Trees outside Woodland use case example: VOM tree detection validation

Defra required a count of trees along parcel boundaries in England to provide evidence for agri-environment schemes such as HRW3: Maintain or establish hedgerow trees. ToW helped validate if the established method for identifying individual trees could be applied to land parcel boundaries.



"This action's aim is that you maintain or establish hedgerow trees to help provide: habitat for wildlife and carbon storage benefits"

~SFI, HRW3: Maintain or establish hedgerow trees advice, Feb 2024.

"Boundary trees can benefit your business. They can: provide food and shelter for livestock and crops boosting their health and yield, supply wood for timber and fuel, provide a source of fruit and other ingredients for food and drink, screen unsightly developments and protect privacy, and boost populations of beneficial insects which can pollinate crops and help control pests and diseases."

~Establish trees along field boundaries, Defra Farming Blog

Problem:

Defra's Farming and Countryside Programme (FCP) require a metric of the number of hedgerow trees per 100m of parcel boundary for all parcels in England. This will inform projects and payments that benefit biodiversity in farmed landscapes.

Solution:

The Environment Agency's LiDAR Vegetation Object Model (VOM) was used to identify riparian trees (but not field boundary trees) using 1m LiDAR to recognise tree canopies above 2.5m height. Although the ToW data itself did not contain the coordinates of individual trees (and therefore could not be used to get the count of trees per 100m) it allowed FCP to validate their tree detection methodology which used the VOM LiDAR product. Individual tree coordinates may be available in future ToW releases.

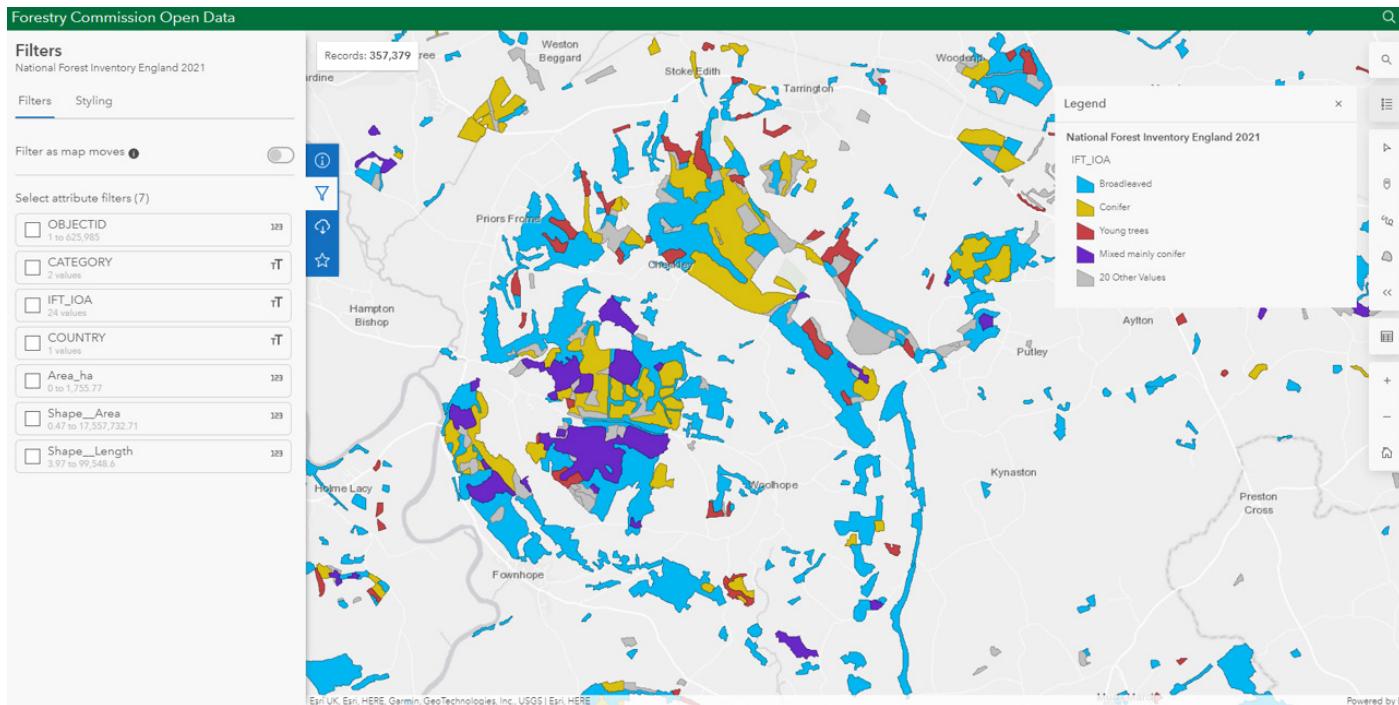
How does NCEA contribute?

Without the ToW product FCP would either need to pay for a suitable data source (e.g. Bluesky Tree map) or use unvalidated tree detection outputs.

Policy impact:

This supports the policy goals of Environmental Land Management's Sustainable Farming Initiative, the England Trees Action Plan, and Biodiversity goals D1 and D3.

National Forest Inventory Plus (NFI+)



Description

Baseline data for woodlands over 0.5ha (extent and quality) is already available from the National Forest Inventory (NFI), which assesses 5k 1ha plots over a 5-year cycle.

Through NCEA, a sub-set of these plots will be visited to gather specific natural capital and biodiversity data using innovative methods (NFI+). Outputs include reports, new data sets and new methods, and an initial evaluation will determine which NFI+ methods will be rolled out and integrated into NFI.

Granularity

National and regional

NCEA Contribution

These innovative surveys are fully funded, designed and delivered by NCEA through Forest Research, in collaboration with other partners (e.g. Bat Conservation Trust)

Technical Summary:

NFI+ is composed of multiple projects, measuring specific biotic and abiotic aspects of ecological condition.

Projects include:

- Biodiversity studies which are measuring the soil microbiome, mycorrhizae, soil invertebrates, canopy invertebrates, terrestrial mammals and bats, using innovative methods such as eDNA analysis, DNA metabarcoding, camera trapping and passive acoustic monitoring (PAM)
- Projects focusing on abiotic impacts on woodland condition include measuring water, soil and air quality

New approaches to monitoring anthropogenic pressures are also being trialled using movement sensors, mobile phone data, Citizen Science and PAM. Building on the successful deployment of PAM for woodland bat monitoring, this technology is now being applied to woodland bird communities.



NFI+ is building on the existing National Forest Inventory.

Ancient Woodland Inventory



Description

Updated version of the Ancient Woodland Inventory that records ancient woodland greater than 0.5 hectares and captures Ancient Wood Pasture and Parkland sites across England. The inventory identifies over 52,000 ancient woodland sites in England.

Granularity

0.25 ha minimum mapping unit

NCEA Contribution

The NCEA funds ecological expertise to support the development of the inventory where such resource is unavailable, thus ensuring it provides a national picture. This is the first update to the inventory since the 1980's.

Figure 1: A snapshot of an area in Devon as it appears in the previous 2008 AWI (top) in comparison to the current 2023 update of AWI (bottom). © Natural England 2023, contains data derived from Ordnance Survey data © Crown copyright and database right 2023. OS licence no. AC0000851168.



Technical Summary:

Ancient woodland is identified using presence/absence of woods from old maps, information about the wood's name, shape, internal boundaries, location relative to other features, ground survey, and aerial photography.

The information recorded about each wood and stored on the Inventory Database includes its grid reference, its area in hectares and how much is semi-natural or replanted. The GIS data layer of Ancient Woodlands is separated into Ancient Semi-natural woodland (ASNW) and Planted Ancient Woodland Sites (PAWS). Mapping began in the 1980s.



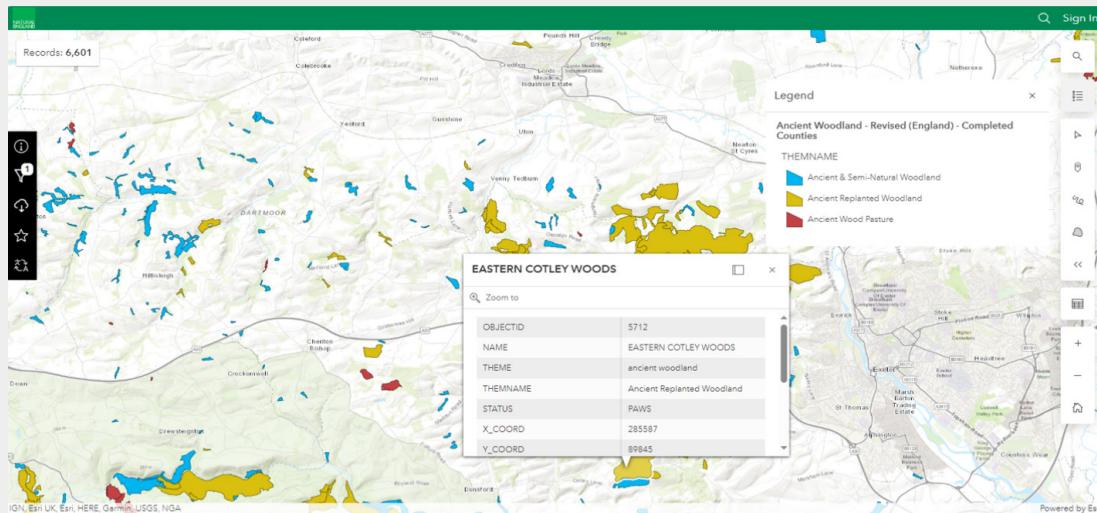
Ancient
Woodland
Inventory



Ancient Woodland
Revised
(England)
data.gov.uk

Ancient Woodland Inventory use case example: Planning authorities

There are strong planning policies in place to protect Ancient Woodland, however, to implement this protection, planning authorities need to know where the Ancient Woodland is and have confidence about its status. The AWI+, published in 2025, will greatly improve this planning.



"Ancient woodlands have always been an important part of the historic landscape in Devon. Much of the County (including Dartmoor) was covered by primeval forests after the Ice Age, where Mesolithic hunter-gatherers created small glades to attract deer and boar."

Devon County Council.

"Over 300 ha of ancient woodland were recorded as lost between 2001 and 2011."

Woodland Trust

Problem

Devon has semi natural woodlands within valley systems or interspersed within the heavily modified farmed landscape. This woodland includes some of the UK's rarest Atlantic species assemblages.

They are historic, fragile, and highly fragmented. Local Authorities (LAs) strategic planning or building control functions need to understand this complex landscape without ecological expertise.

Solution

Planning Officers will use the revised AWI created by DBRC and partners to enable a constraints layer to be applied within statutory processes. This will ensure that ancient woodland is accounted for wherever possible.

How does NCEA contribute?

The NCEA partially funds the AWI Update project (to be published 2025) which will deliver an accurate inventory of the entirety of England's ancient woodland resource, including those woods smaller than 2ha which are currently not mapped. It will ensure that the AWI is used by planners, developers and land managers.

Policy impact

These support the commitment in the 25-year Environment Plan to increase tree canopy and woodland cover from 14.5% to 16.5% of England's land area.

Citizen Science



Description:

The NCEA Citizen Science project aims to better leverage the significant contributions of volunteers to environmental data collection, which currently informs over 70% of Government biodiversity reporting. Recognising the diverse and often uncoordinated nature of these volunteer efforts, the project aims to map, standardise, and coordinate collective survey effort to improve the assessment of natural capital and ecosystems. This represents a shift from a historical focus on accessing existing third-party data to actively understanding and enhancing third-party survey practices.

The Citizen Science project is developing and testing methods and procedures to better convene and coordinate organisations that involve volunteers in nature and environment studies. Our survey framework logic model maps existing practices against our science & evidence needs, helping clarify capabilities and gaps. In parallel we are advancing standardised survey methods and tools for key subject areas.

The project aims to combine a range of survey capabilities within integrated survey designs to benefit landscape and city-level studies and assessments. In addition, we are working to advance and test models to maximise the adoption and implementation of standardised surveys. This includes preparing place-based trials in various landscapes and cities between now and 2028. Ultimately, the project aims to enhance the UK's collective capacity for environmental surveying in a way that addresses shared needs and encourages collaborative investment. The Citizen Science project is actively testing and informing a sustainable future model that incorporates contributions from NGOs and other sectors.

Technical Summary

The NCEA Citizen Science work has three strategic areas:

- **Strategic Coordination** – an effective community of differentiated survey capability and effort, collaboratively resourced, prioritised and coordinated at scale. Strategic coordination was initially researched in three pilots (2 regional and 1 county-level) from 2023-25. A survey coordination model is to be tested across multiple (~6) landscapes and cities from 2025-28.
- **Monitoring Frameworks** – a logic chain mapping survey projects and methods (capability) to science & evidence needs (official indicators & metrics), packaged to provide a shared narrative for environmental survey and monitoring, to harmonise community effort and resource.
- **Resource Library** – a community space to share, discover, access, and co-develop differentiated resources that aid and advance the study of nature and the environment. Includes survey methods/protocols, tools, best practice, standards and rulesets.

The work here is designed to benefit those setting up environmental or nature-based monitoring programmes, or those who would benefit from consistently collected data at scale. eNGOs represent key project stakeholders and collaborators, but there is wider interest from and potential to engage participation and contribution from new organisations and wider sectors, relevant to future service delivery.

NCEA Contribution

Fully funded, designed and delivered by NCEA

Pollinator Monitoring and Citizen Science

A practical guide for project organisers and participants



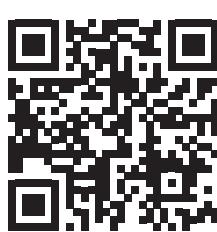
UK Centre for Ecology & Hydrology



JNCC Report 756: Review of monitoring biodiversity effectively at differing scales
JNCC Resource Hub



JNCC Report 754: Review of opportunities for urban biodiversity monitoring
JNCC Resource Hub

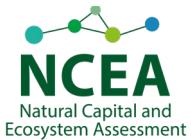


A framework for collaboratively monitoring nature and the environment: (2024). Bane, M., Pocock, M., Pilsbury, A., Grafton, O., & Jefferies, A.



Webpage for sharing resources on the JNCC website.

NCEA Conceptual Ecological Model



Description

The NCEA Conceptual Ecological Model is a high-level conceptual framework of nested diagrams that set out (for England's socio-ecological system) the relationships between: Natural Capital Assets (stocks and processes); the Drivers, Pressures and Responses that act on them, and Impacts of changes on Ecosystem Services, Beneficiaries and Human Well-being.

It consists of two diagrams:

- A conceptual framework that provides an overview of the full socio-ecological system
 - A systems diagram focused on the links between different natural capital assets

NCEA Contribution

NCEA commissioned UKCEH to develop this work.

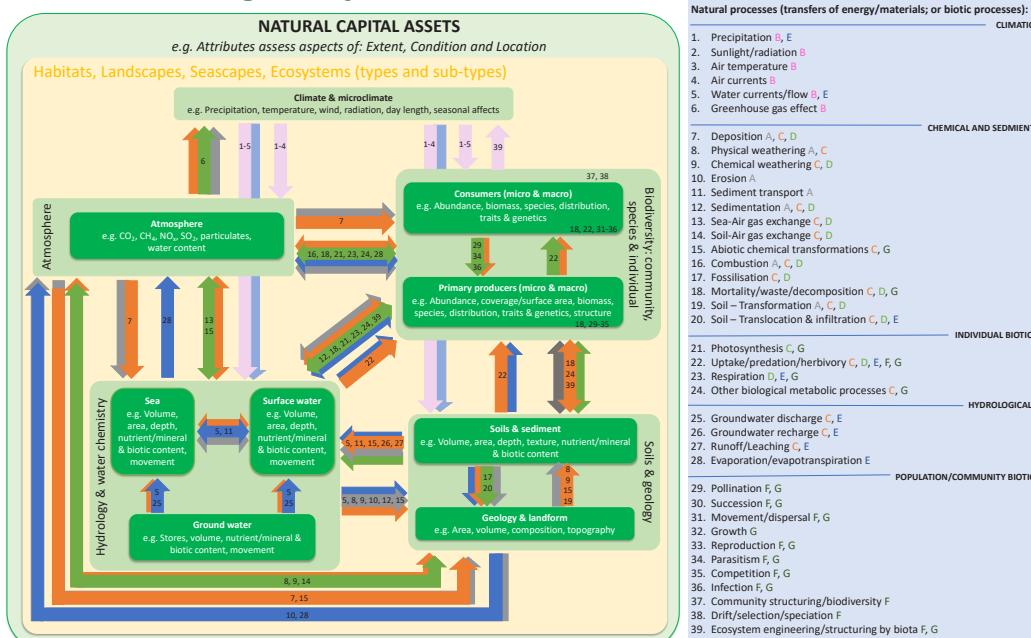
Overview:

The CEM is a common framework to which Defra, partners and customers can map their ecosystem evidence and policy work. It allows you to identify the ecosystem components of interest to your work and understand how they interact with other ecosystem components, processes and functions that compose the natural environment, and consider the drivers, pressures and responses acting on the ecosystem.

It aims to provide a common vocabulary with which you can tell the story of whatever question you are dealing with and build a shared understanding. The CEM encourages iterative, systems thinking & adaptive research. It also highlights critical attributes of the system that need monitoring to ensure all relevant components are considered in project design. It does this by showing:

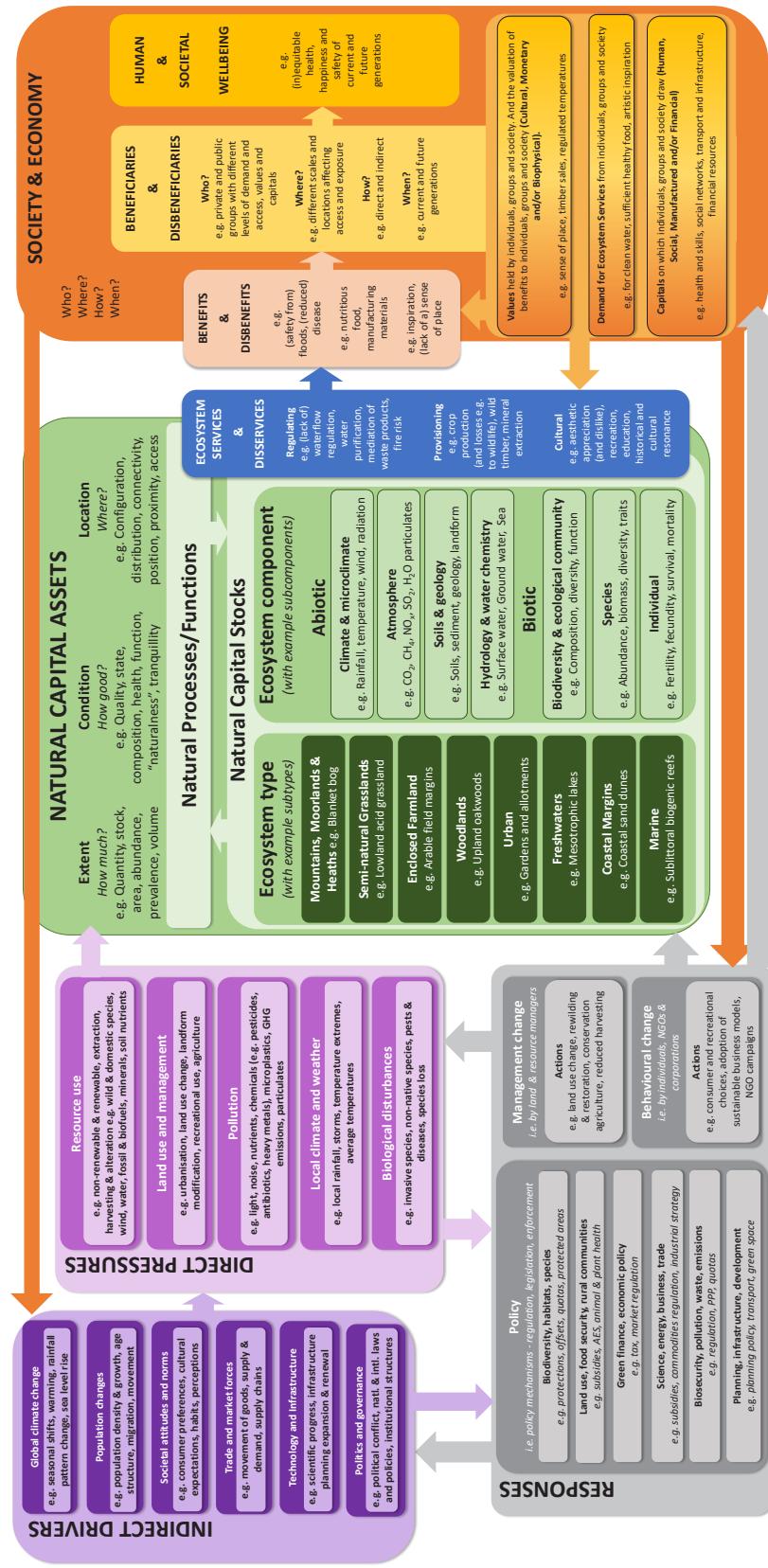
- Inputs to and outputs from different ecosystem components
 - Connections between ecosystems and the wider context
 - Mechanisms for change in the ecosystem
 - Responses that might occur as a result of management interventions

The CEM Ecological Systems Model



NCEA Conceptual Ecological Model

The CEM Conceptual Framework



Brochure Definitions

Description	A high-level overview of the product collection and what information it will provide.
Granularity	The level of detail delivered by the product. For remote sensing products this describes the resolution/scale etc of the product (if applicable). For strategic sample based products, it details whether the product provides national scale data only or whether it also provides regional level data, and if so, to what scale.
Availability	Clarifies whether the product is currently published and openly accessible, and if not, an expected date for when the product will be published. In some cases, there may be interim datasets which are released prior to full publication which will be outlined here. Delivery dates for yet to be published products are estimates and may change due to foreseen and unforeseen circumstances.
NCEA Contribution	Explains the role that NCEA played in the production of this product. This varies between product collections. For example, in some instances the product is fully funded, delivered and analysed by NCEA, whilst in others NCEA has provided additional funding and resource to an existing output.
Technical Summary	Provides a more detailed explanation about the types of measurements which are collected to generate this product. For products which are not collecting data but providing a service, this outlines more specific detail regarding the work being undertaken.
Actual use case	An example where an NCEA product has been used in a real-life scenario.
Potential use case	An example where, once NCEA delivers what is outlined, a customer expects to be able to use it in the described scenario.

Product Categories

Vegetation & Landscapes	Vegetation is an assemblage of plant species and the ground cover they provide. Landscapes are the visible features of an area of land, its landforms, and how they integrate with natural or human-made features.
Solis and Peat	Soils are vertical profiles of weathered geological material (including sediments) and organic deposits. Geology is the original parent material from which soils are weathered.
Fresh Water	The system covering ground and surface water. Ground water is all water that exists in soils, sediments and rock, including groundwater, the water which is stored below the water table. Surface water describes bodies of freshwater in non-marine and coastal environments, including streams, rivers and lakes.
Trees and Woodland	A tree is a plant with at least one woody stem expected to achieve a height of at least 5m. Woodlands are areas of trees with a minimum area of 0.5ha, a minimum width of 20m, and a potential tree canopy cover of at least 20%.
Citizen Science	Research conducted with participation from the general public, or amateur/non-professional researchers or participants for science, social science and many other disciplines.
Species	A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
Biodiversity	The variability among living organisms in a particular habitat and the ecological complexes of which they are part.

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Special Thanks to our partners:

