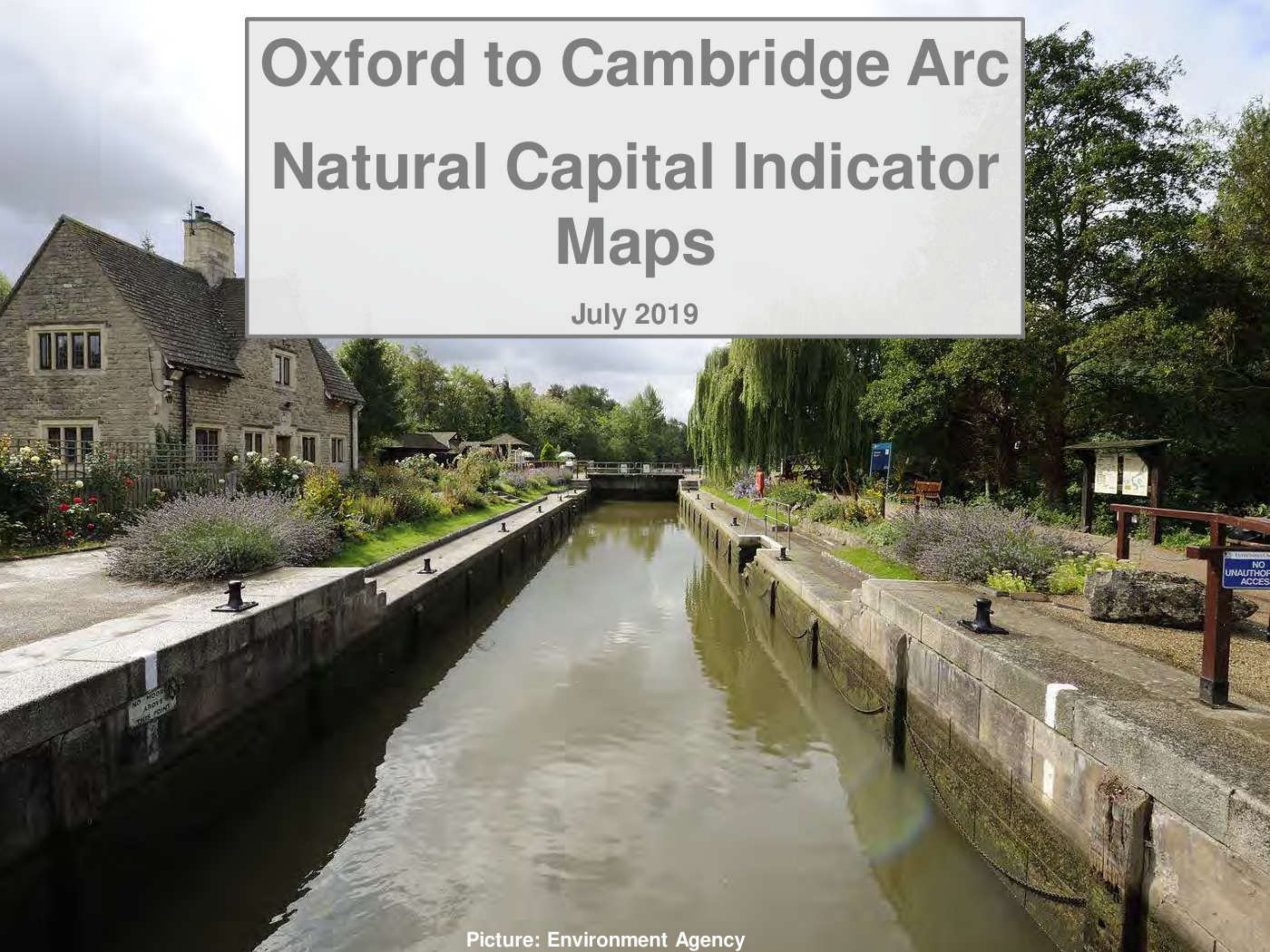


Oxford to Cambridge Arc Natural Capital Indicator Maps

July 2019



Picture: Environment Agency

Natural Capital Indicator Maps



Purpose of Report

This report provides summary maps of natural capital assets, and highlights the associated ecosystem services, across the five ceremonial counties that make up the Oxford to Cambridge Arc - Bedfordshire, Buckinghamshire, Cambridgeshire, Northamptonshire and Oxfordshire.

The maps and supporting information are based on national data sets and replicate the approach used by Natural England in their Natural Capital Atlas

These maps are intended to provide a broad overview of the relative value for key natural capital indicators in an Arc-wide context, in terms of the quantity and location of those assets. This report is the first step in providing a consistent and shared baseline of natural capital stocks across the Arc as part of the Arc-wide Local Natural Capital Plan (LNCP) project.

These maps have been produced to generate discussion, engage stakeholders and inform future more detailed mapping and assessment work as part of the LNCP.

Natural Capital

The 25 Year Environment Plan defines Natural Capital as 'the sum of our ecosystems, species, freshwater, land, soils, minerals, our air and our seas. These are all elements of nature that either directly or indirectly bring value to people and the country at large.

Ecosystem Services

Ecosystem services are the functions and products from nature that can be turned into benefits.

Natural Capital Indicators

Natural England's Natural Capital Indicators Project generated a series of indicators through understanding the links between natural capital assets and the ecosystem services they provide. It is these indicators that can act as effective, early-warning, indicators of change and are the basis of this report.

Mapping methodology



The Oxford to Cambridge Arc was broken down into a 1 km² Hexagon Grid



For each indicator / habitat, datasets were overlaid on top of the grid system and each hexagon given a value. For most indicators this value is the km² coverage of the indicator within each hexagon



The symbology scale used for each indicator is determined by the range of values within the arc of that indicator. This helps to highlight areas of habitat which have a high coverage within the Arc but would be missed if compared to national datasets



These maps are not designed to be used at a local scale or to influence local planning decisions. They are designed to give a strategic overview of natural capital within the Arc and to assist in early engagement.

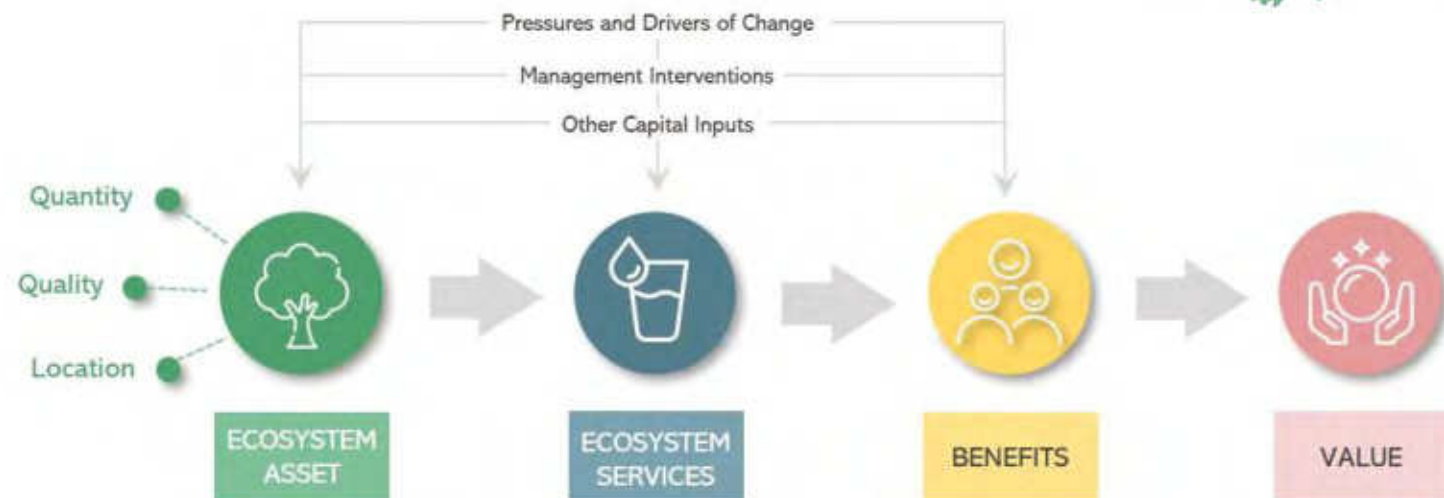
Ecosystem Logic Chains



Natural England have shown the links between ecosystem assets, services, benefits and value to people, through the use of logic chains. These show how the state of natural capital, its quantity, quality and location, affect the services and benefits it provides.

Natural England's Natural Capital Indicators Project identified short and long list indicators for measuring change and their Natural Capital Atlas mapped the short list indicators. For our report we are using some of these indicators.

Where data is not available to map a short list indicator, a long list indicator is mapped. Data gaps are identified where no data exists to map an indicator.



Natural England (2019). National Natural Capital Atlas. Natural England Commissioned Report by Westcountry Rivers Ltd.

Example – Logic chain showing the characteristics that link woodland assets to the ecosystem service - air quality improvement. Short-list indicators are underlined

Quantity	Quality					Ecosystem Service Flow
- Coniferous woodland - Broadleaved mixed and yew woodland - Individual trees/veteran trees	- Soil/sediment processes: - Soil depth - Soil bacteria - Soil mycorrhizal associations - Soil water retention - Soil type - Soil erosion - Degree of compaction - Infiltration - Nutrient (and chemical) status: - Soil N, P, C, pH - Atmospheric deposition (Exceedance of critical loads – S, N, ozone)	- Vegetation: - Age structure - Canopy (density and spp. composition) - <u>Leaf surface area and duration across year</u> - Understory (density and spp composition) - Shadiness - Structural diversity - Cover/bare soil - Surface roughness/microtopography - Tree health	- Species Composition: - Naturalness of biological assemblage (no. of trophic levels and spp. Composition within levels) - Geology and topography: - Geology - Altitude, slope, aspect, landform - Catchment characteristics	- Climatic: - Air temperature - Sunlight/cloud cover - Precipitation (incl. distribution, seasonality, intensity) - Snow cover and length of snow lie - Frequency of freeze thaw - Wind (especially for wind throw) - Drought - Length of growing season (vegetation)	<u>Air Pollutants removed by vegetation</u>	Benefits Clean air, also underpinning health benefits
Location - Distribution, connectivity and fragmentation of woodland and interaction with other habitats <u>Distribution of woodland in relation to settlements</u>						Value It is difficult to measure the value of cleaner air, monetary savings (e.g. from reduced healthcare needs) should be considered, as well as social cultural and environmental value

Natural England (2019). National Natural Capital Atlas. Natural England Commissioned Report by Westcountry Rivers Ltd.

River Catchments: The water quality, flood protection and water supply ecosystem services have been assessed on whole hydrological catchments, not just the fresh water habitats themselves. Land across the wider catchment can play a vital role in regulating water supply, quality and flows.

Asset Quantity Indicators

The Natural England Natural Capital Indicators report identified ideal indicators for measuring change in Natural Capital, this is a summary of all them associated to asset quantity. This report has been produced using a subset of these to provide a broad overview of Natural Capital within the Oxford – Cambridge Arc



Freshwater

Active flood plain
Blanket bog
Coastal and floodplain grazing marsh
Rivers
Lakes and standing waters
Reedbeds
Lowland Fens
Lowland raised bog
Modified waters e.g. reservoirs and canals
Other semi-natural habitats
Ponds
Woodland

Grasslands and Heath

Hay meadows
Other semi-natural grasslands
Dwarf shrub heath

Urban

Blue space
Green space -not semi-natural
Open mosaic habitats
Urban/street trees
Woodland, scrub and hedge
Semi-natural habitats

Farmland

Arable and rotational leys
Horticulture
Improved grassland
Orchards and top fruit
Permanent pasture

Woodland

Broadleaved, mixed and yew woodland
Coniferous woodland
Individual trees/veteran trees
Woodland priority habitats
Ancient woodland

Mountain & Moor

Coastal

Marine

The indicators for these habitat types have not been included as they are not present with the arc (Heath is normal grouped with Mountain and Moor however it has been included with grassland in this report)

Included in this map series

Not Included in this map series

Asset Quality Indicators

The Natural England Natural Capital Indicators report identified ideal indicators for measuring change in Natural Capital, this is a summary of all them associated to asset quality. This report has been produced using a subset of these to provide a broad overview of Natural capital within the Oxford – Cambridge Arc



Hydrology and Geomorphology

Extent of artificial drainage
 Natural aquifer function -recharge and discharge
 Naturalness of flooding regime
 Naturalness of flow regime
 Naturalness of lake hydrological regime
 Naturalness of water level regime
 Lack of physical modifications of water bodies
 River continuity –lack of obstructions

Nutrient and Chemical Status

Atmospheric deposition -exceedance of critical loads
 Chemical status of water bodies
 Nutrient status of water bodies
 pH
 Nutrient status of soil

Soil/Sediment Processes

Sediment supply/availability (inc.type, grain size)
 Peat depth
 Soil/sediment carbon/organic matter content
 Soil/sediment biota

Vegetation

Extent and condition of linear vegetation features and pockets of semi natural vegetation
 Plant growth rate
 Presence and frequency of pollinator (larval and adult) food plants
 Proportion of peat mass actively forming peat
 Surface/vegetation roughness
 Vegetation cover/bare soil
 Vegetation next to water bodies
 Vegetation structure/structural diversity

Species Composition

Invasive non-native species
 Net productivity by species
 Naturalness of biological assemblage -no. of trophic levels and community composition in each level
 Plant species diversity

Cultural

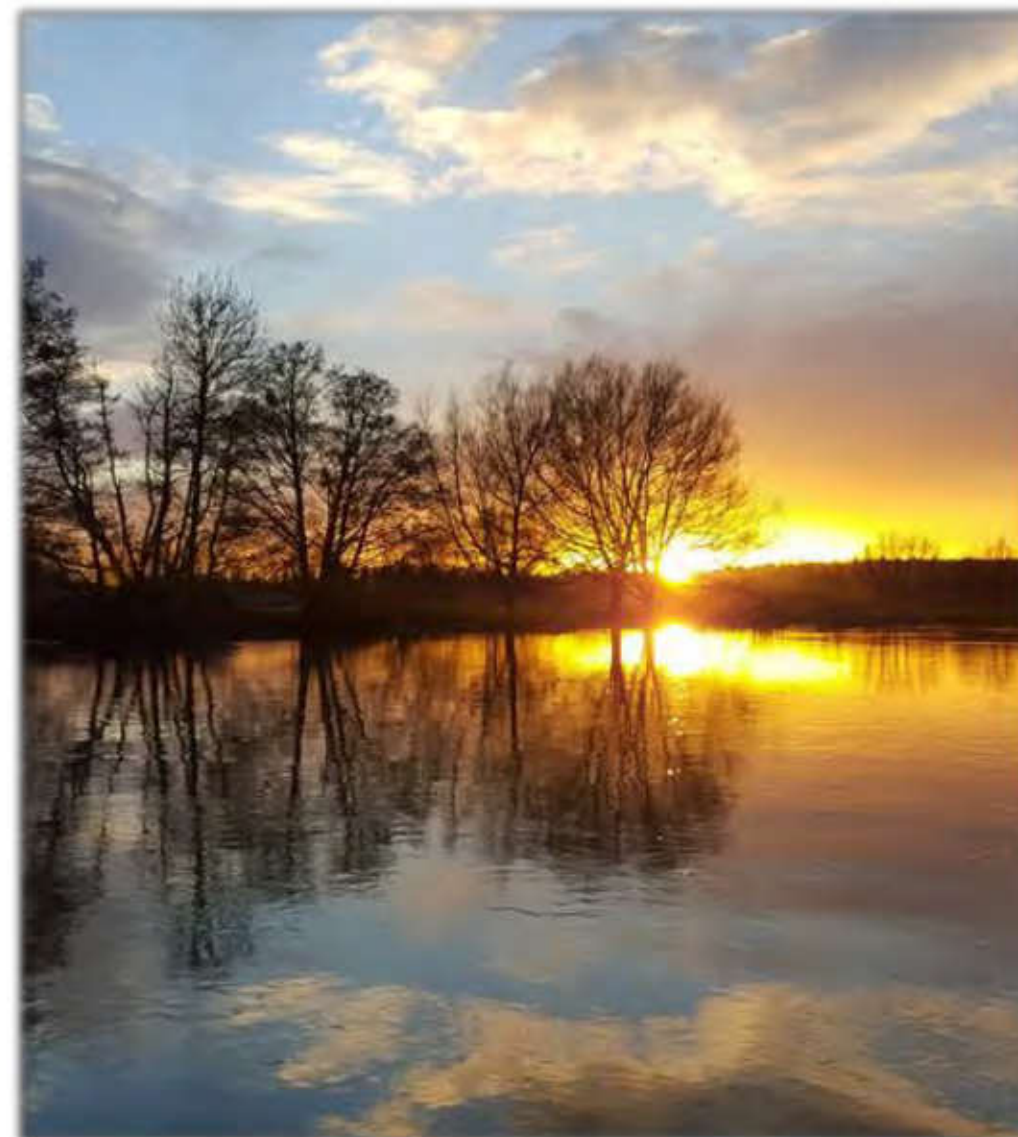
Visibility of wildlife
 Presence of flagship species
 Presence of rare (red list) species
 Species diversity
 Naturalness of watercourses
 Favourable condition of SSSIs/geosites/MPAs
 Size of environmental space
 Boundary features: type, length and condition
 Designated historic environment assets
 Tranquillity
 Perimeter access points
 Public Rights of Way
 Presence of paths accessible to all
 No. of organised events
 Presence of clubs, schools, training centres
 Active geomorphological processes

Included in this map series

Not Included in this map series

Report Content

Asset Quantity – Freshwater.....	p.8
Asset Quantity – Farmland.....	p.13
Asset Quantity – Grassland & Heath.....	p.17
Asset Quantity – Woodland.....	p.20
Asset Quantity – Urban Environment.....	p.24
Asset Quality – Hydrology & Geomorphology.....	p.29
Asset Quality – Nutrient & Chemical Status.....	p.32
Asset Quality – Soil / Sediment Processes...	p.35
Asset Quality – Species Composition & Vegetation.....	p.38
Asset Quality – Cultural.....	p.40
References.....	p.44



Picture: Environment Agency



**Asset
Quantity**

Picture: Natural England

Asset Quantity: Freshwater



Freshwater habitats encompass all water bodies and wetlands, such as rivers, lakes, ponds, fens, marshes and bogs. The importance of artificial freshwater habitats, such as canals and reservoirs, for some ecosystem services is also acknowledged. Despite occupying only 0.7% of land in England (CEHLCM, 2015), freshwater habitats are vital for many plant and animal species, including the water vole, Britain's fastest declining mammal.

Freshwater habitats can regulate flooding, erosion, sedimentation, local climates and water quality, while facilitating the dilution and disposal of pollutants. Additionally, rivers provide cultural value for recreation, tourism, and education (UKNEA, 2011). This assessment primarily focuses on freshwater habitats themselves (i.e. water bodies and wetlands). However, indicators of importance for water quality, water supply and flood protection are considered for whole fresh water catchments.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

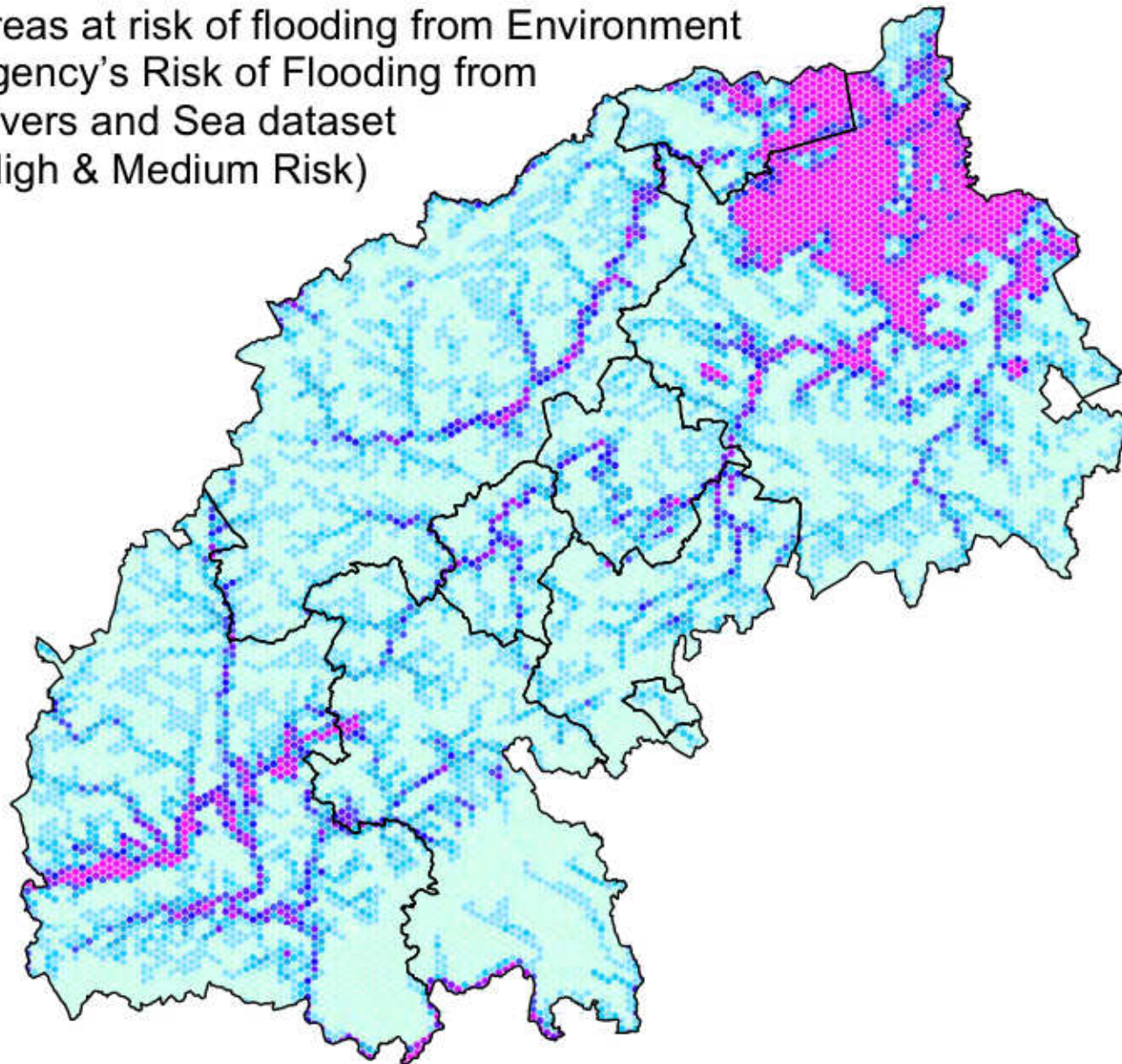
The water quality, flood protection and water supply ecosystem services have been assessed on a whole hydrological catchment basis.

Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Active floodplain												X						
Floodplain grazing marsh						X		X				X		X		X	X	
Main Rivers						X		X				X		X			X	
Lakes						X		X				X		X			X	
Reedbeds						X		X				X		X		X	X	
Lowland fens						X		X				X		X		X	X	
Canal & surface water transfers						X								X			X	

Asset Quantity - Freshwater

F Active Floodplain

Areas at risk of flooding from Environment Agency's Risk of Flooding from Rivers and Sea dataset (High & Medium Risk)

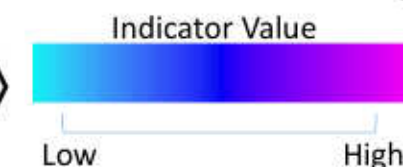


Hexagon values: 0 – 1 km sq

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

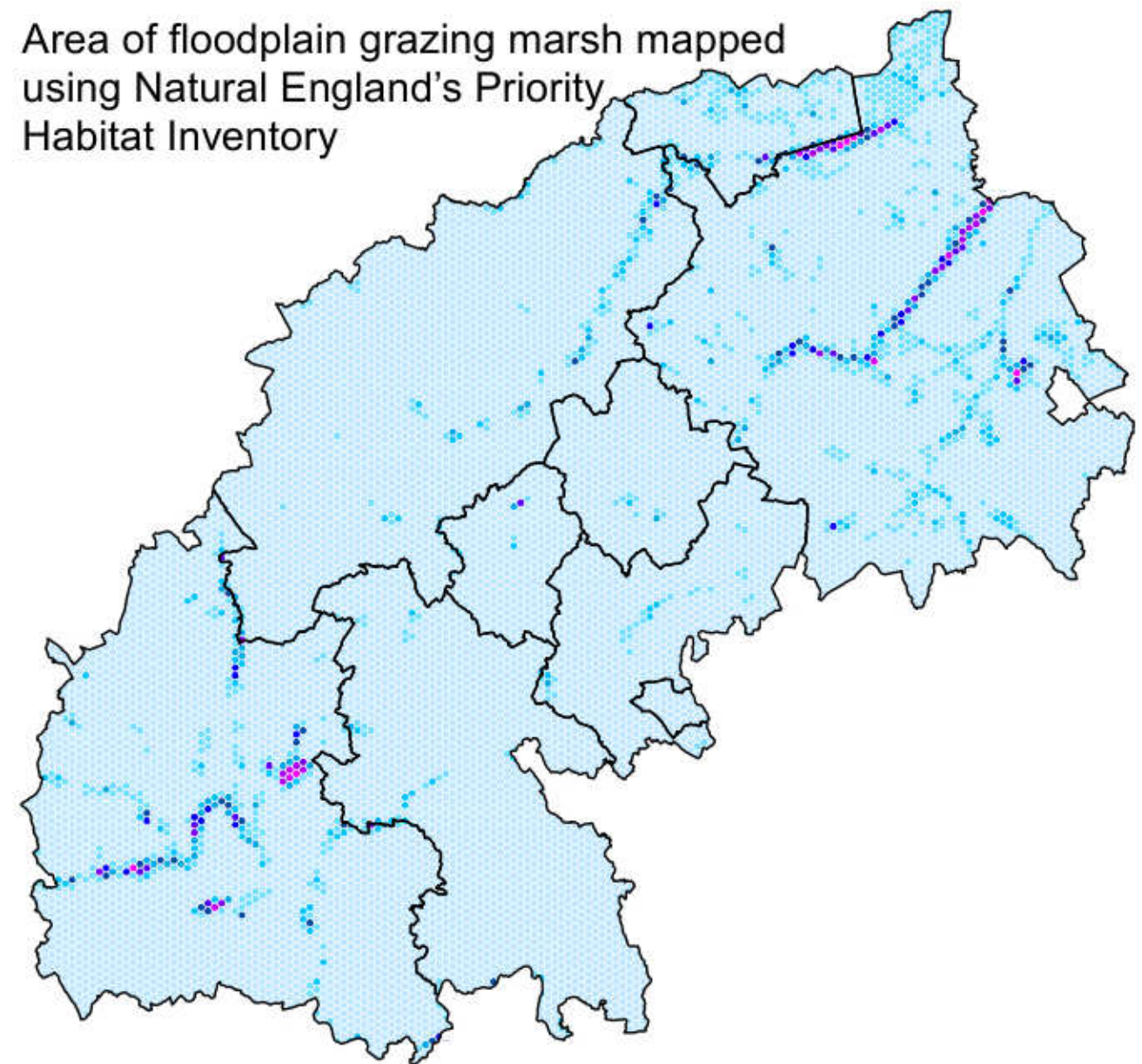
Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery pops and habitats - Pest and disease control - Climate regulation	Cultural services



Local Natural Capital Plan

C W F Floodplain Grazing Marsh

Area of floodplain grazing marsh mapped using Natural England's Priority Habitat Inventory



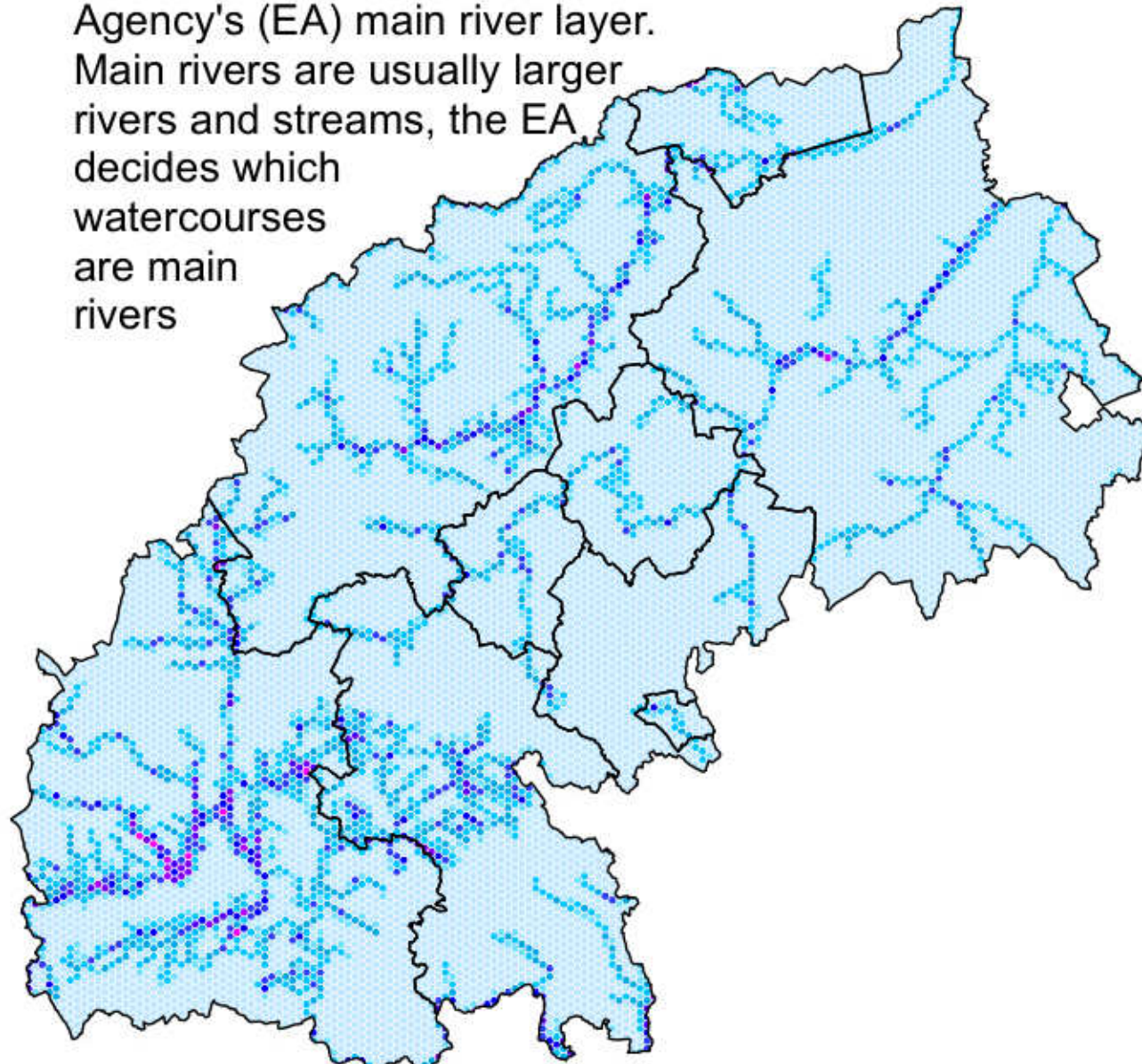
Hexagon values: 0 – 0.94 km sq

Asset Quantity - Freshwater



Main Rivers

Length of rivers mapped using Environment Agency's (EA) main river layer. Main rivers are usually larger rivers and streams, the EA decides which watercourses are main rivers

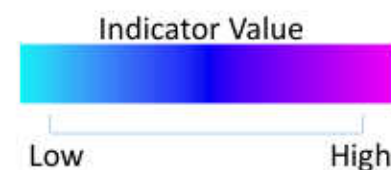


Hexagon values: 0 – 6.37 km

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery pops and habitats - Pest and disease control - Climate regulation	Cultural services

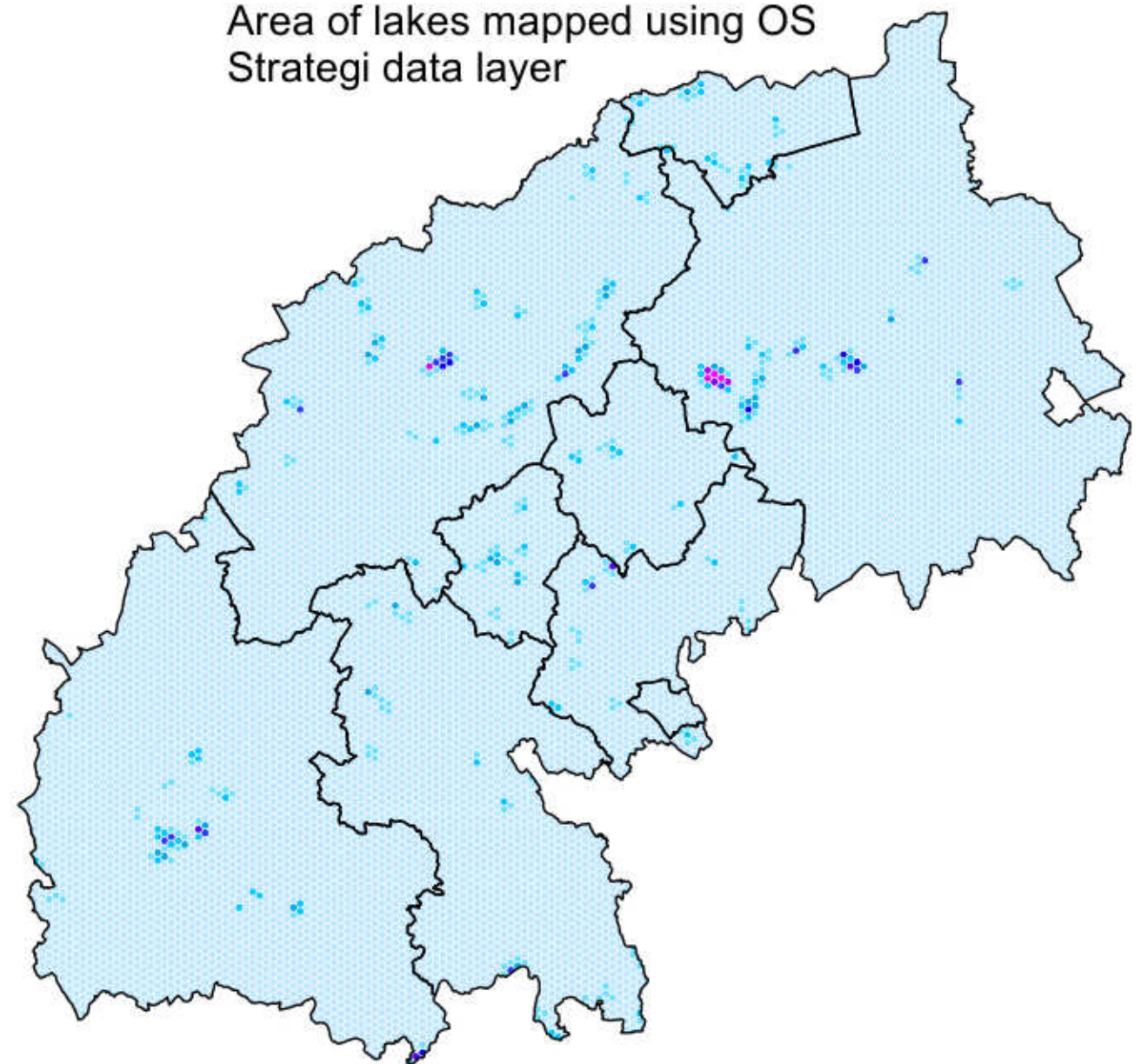


Local Natural Capital Plan



Lakes

Area of lakes mapped using OS Strategi data layer

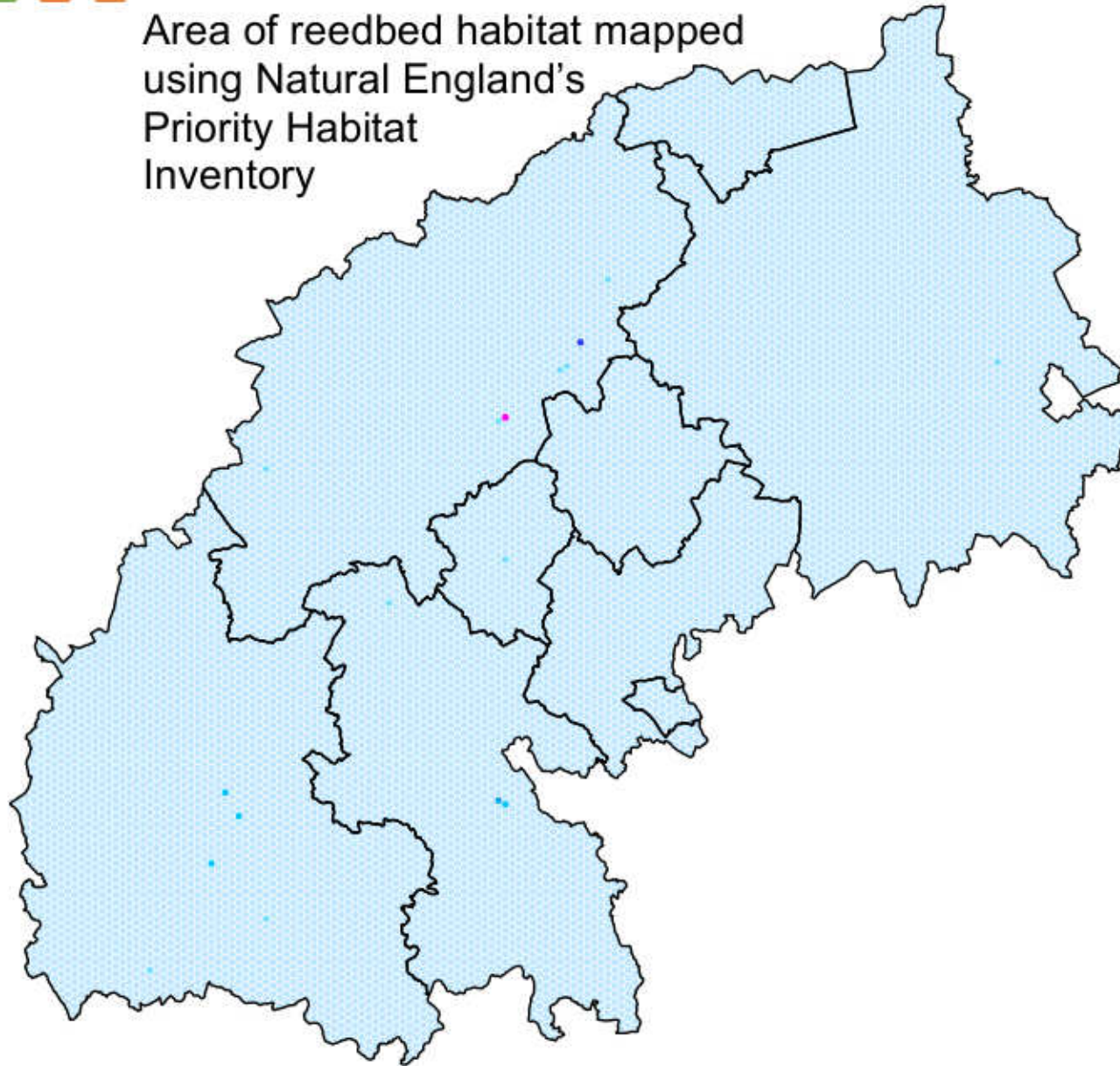


Hexagon values: 0 – 1 km sq

Asset Quantity - Freshwater

Reedbeds

Area of reedbed habitat mapped using Natural England's Priority Habitat Inventory



Hexagon values: 0 – 0.06 km sq

Ecosystems Services Key

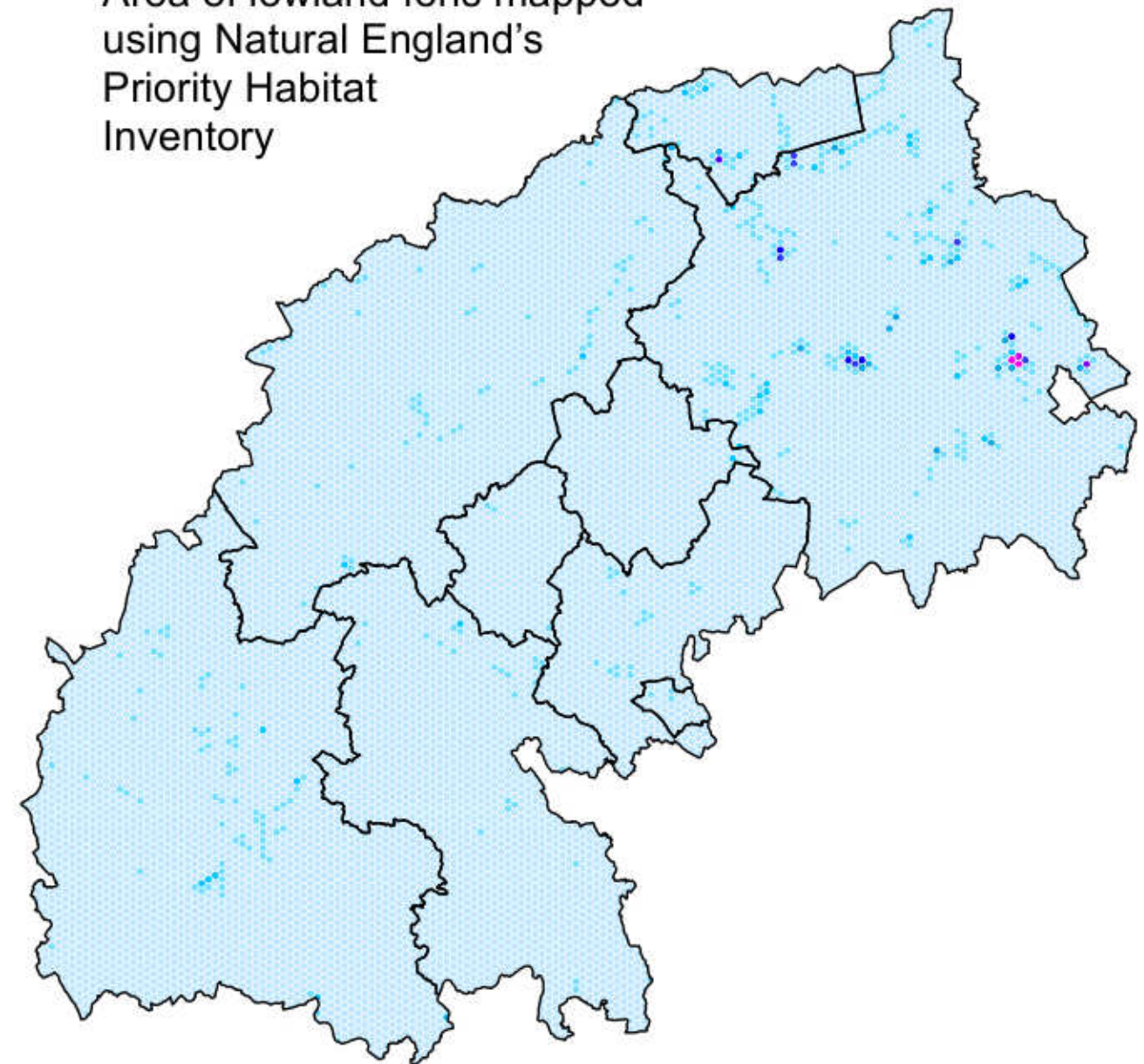
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



Lowland Fens

Area of lowland fens mapped using Natural England's Priority Habitat Inventory

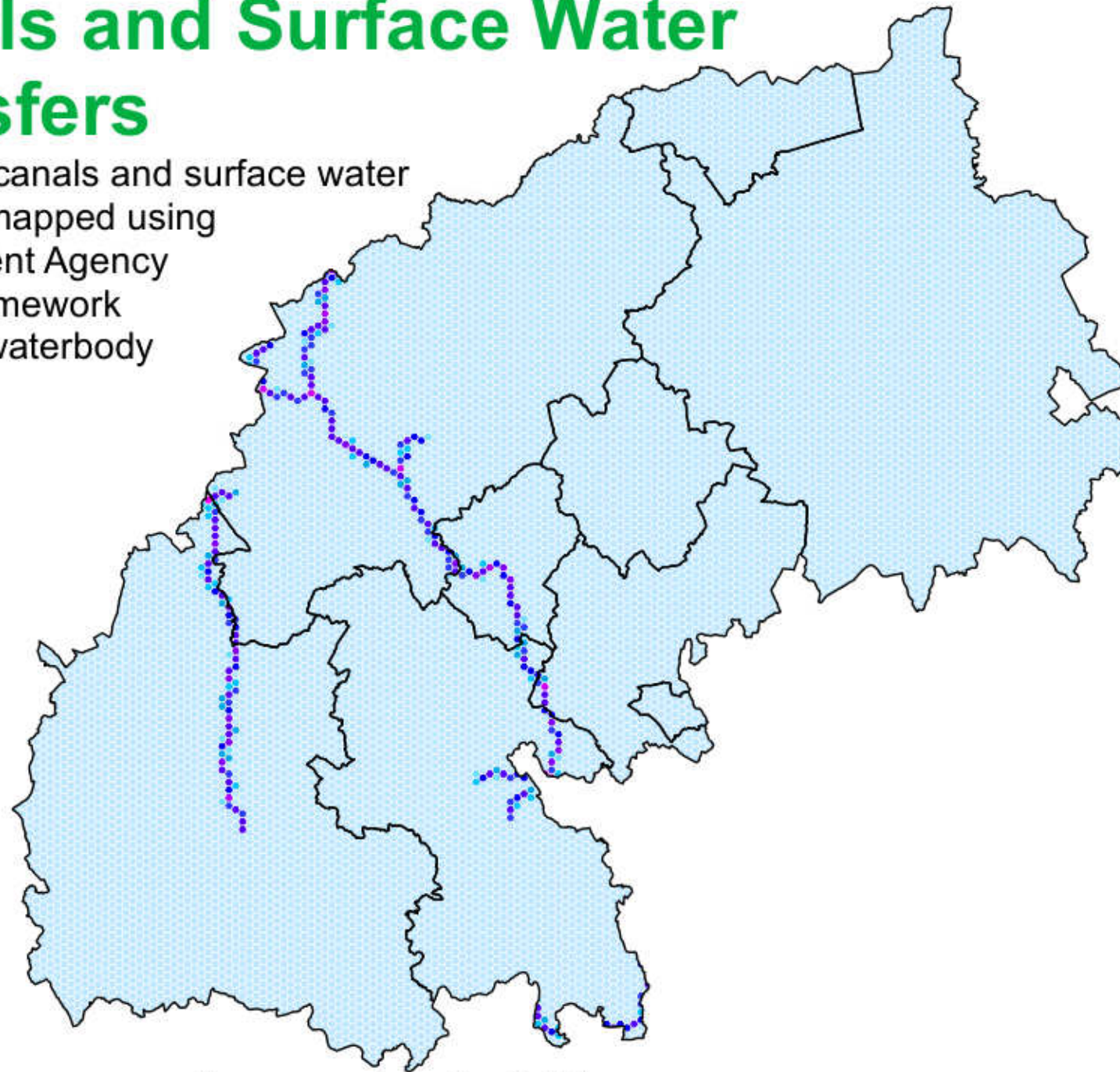


Hexagon values: 0 – 0.72 km sq

Asset Quantity - Freshwater

Canals and Surface Water Transfers

Length of canals and surface water transfers mapped using Environment Agency Water Framework Directive waterbody data

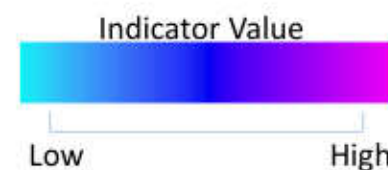


Hexagon values: 0 – 2.15 km

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
 Materials from plants, animals and algae  Wild animals, plants, algae and outputs  Plant-based energy  Aquaculture  Cultivated crops  Water supply  Reared animals and outputs	 Water quality  Air quality  Noise regulation  Mass stabilisation  Flood protection  Pollination and seed dispersal  Maintenance of nursery populations and habitats  Pest and disease control  Climate regulation	 Cultural services



Asset Quantity: Farmland



About 70% of land in the UK is used for agriculture (Defra, 2017), producing a variety of goods for consumers across the UK and around the world. Farmland takes many forms, from grazing pastures to arable fields and orchards; it varies greatly in character across the country. Well managed farmland provides habitat for a variety of animals and plants, including the brown hare, a BAP Priority Species.

In addition to primary agricultural products, farmland provides many other services to society. If managed effectively, farmland can help to prevent soil erosion by stabilising soils, support flood risk alleviation through surface water storage and runoff attenuation, and sequester carbon, assisting in global climate regulation (UKNEA, 2011). Furthermore, farmlands hold significant cultural and heritage value. They are often considered a key component of England's traditional countryside landscape, as well as a place for recreation via rural Public Rights of Way.

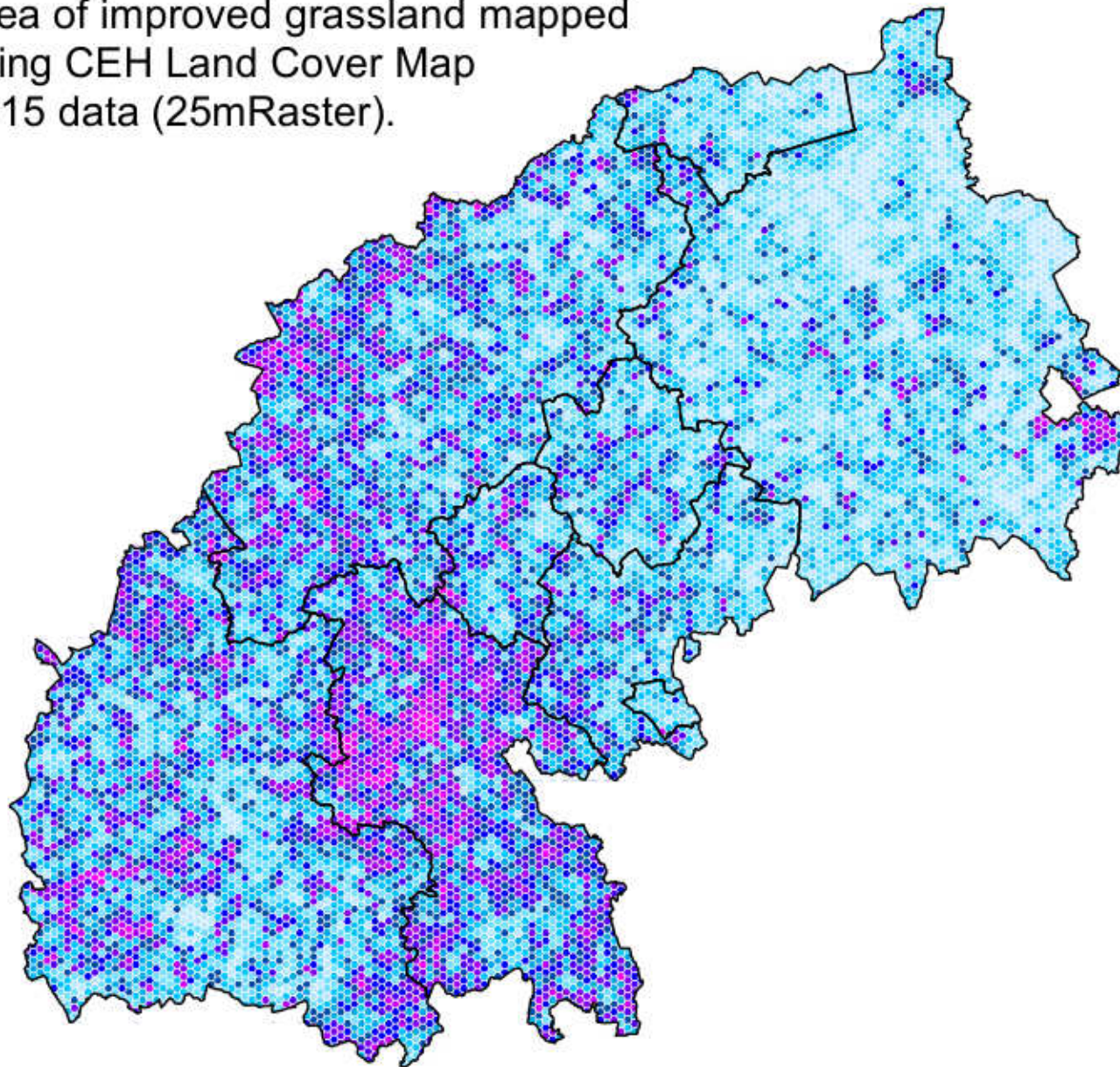
The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Biodiversity services
Improved grassland							X				X					X	X	
Arable and horticulture					X												X	
Arable land					X												X	
Pastures											X					X	X	
Traditional orchards											X					X	X	
Permanent crops											X					X	X	

Asset Quantity - Farmland

Improved Grassland

Area of improved grassland mapped using CEH Land Cover Map 2015 data (25mRaster).



Hexagon values: 0 – 0 km sq

Ecosystems Services Key

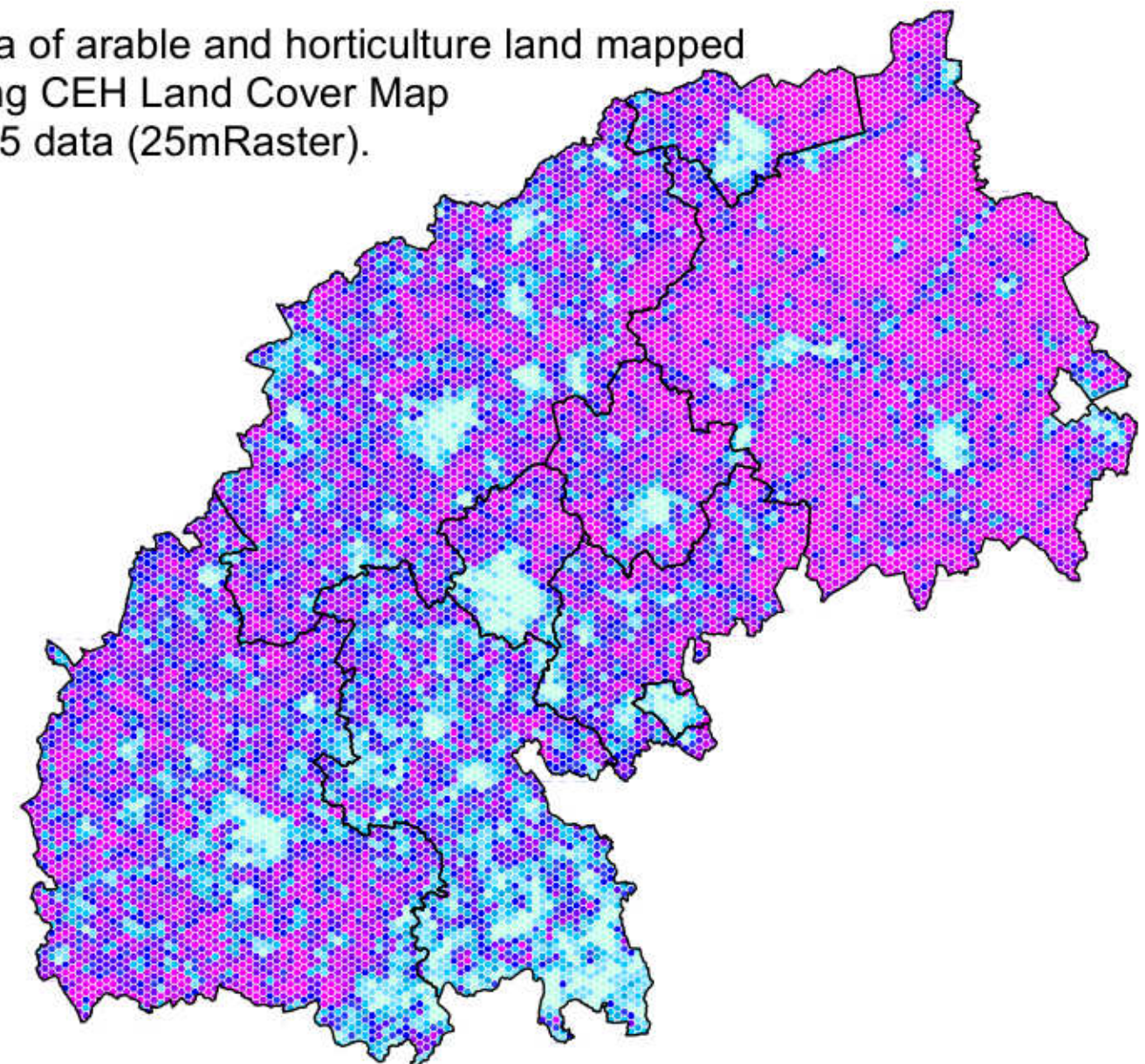
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery pops and habitats - Pest and disease control - Climate regulation	Cultural services



Arable and Horticulture

Area of arable and horticulture land mapped using CEH Land Cover Map 2015 data (25mRaster).

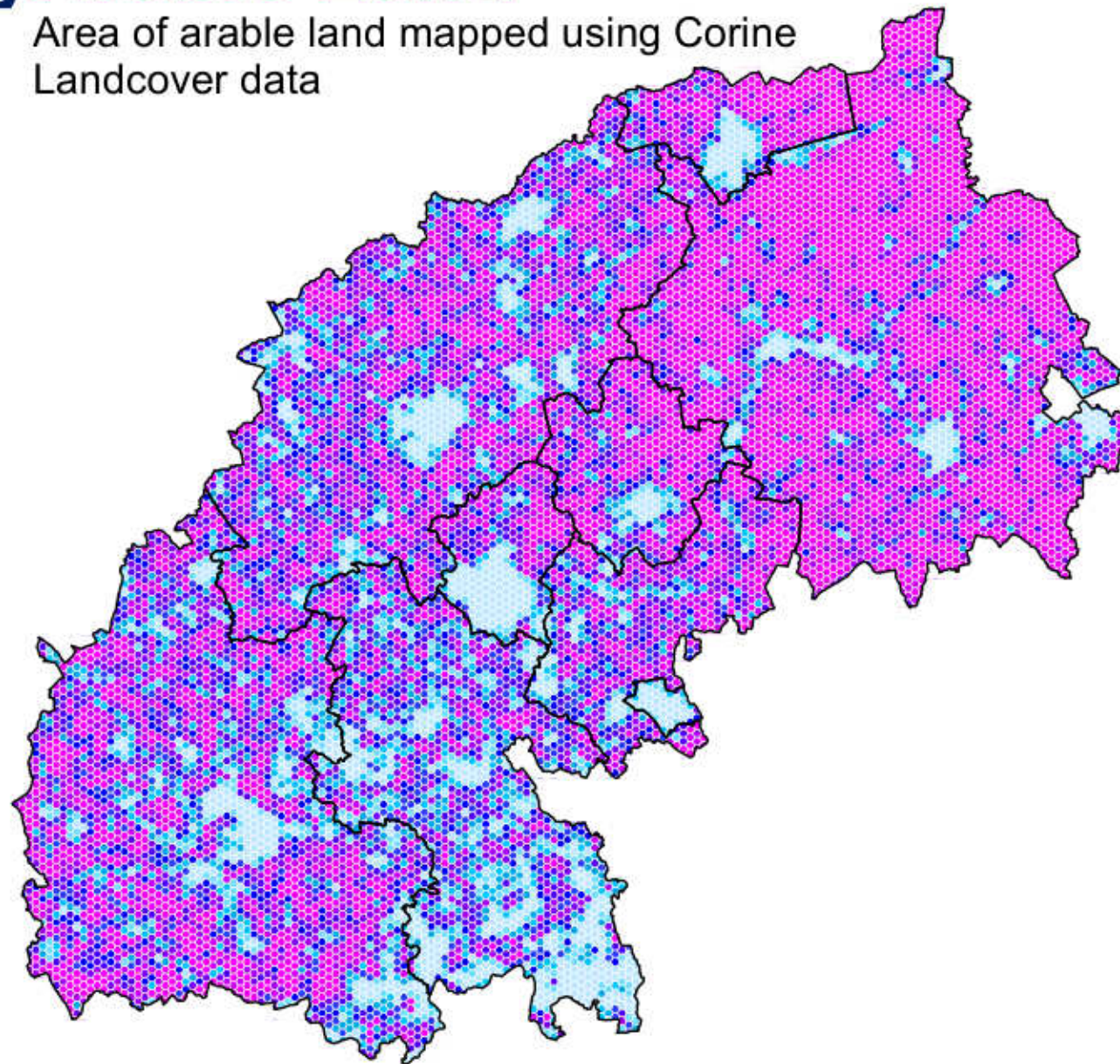


Hexagon values: 0 – 0 km sq

Asset Quantity - Farmland

Arable Land

Area of arable land mapped using Corine Landcover data



Hexagon values: 0 – 0 km sq

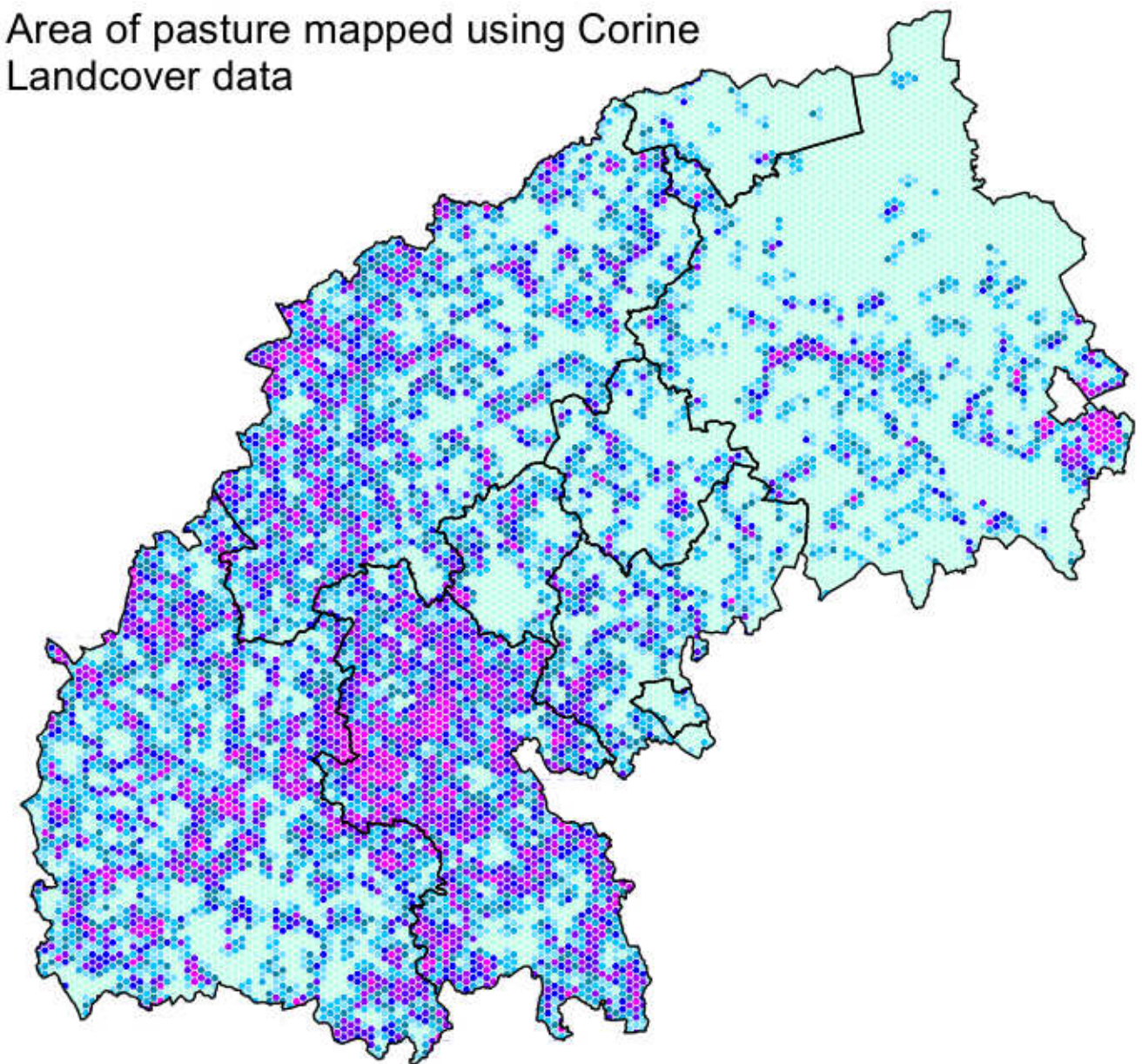
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

- | Provisioning | Regulating | Cultural |
|--|--|-------------------|
| Materials from plants, animals and algae | Water quality | Cultural services |
| Wild animals, plants, algae and outputs | Air quality | |
| Plant-based energy | Noise regulation | |
| Aquaculture | Mass stabilisation | |
| Cultivated crops | Flood protection | |
| Water supply | Pollination and seed dispersal | |
| Reared animals and outputs | Maintenance of nursery pops and habitats | |
| | Pest and disease control | |
| | Climate regulation | |

Pastures

Area of pasture mapped using Corine Landcover data



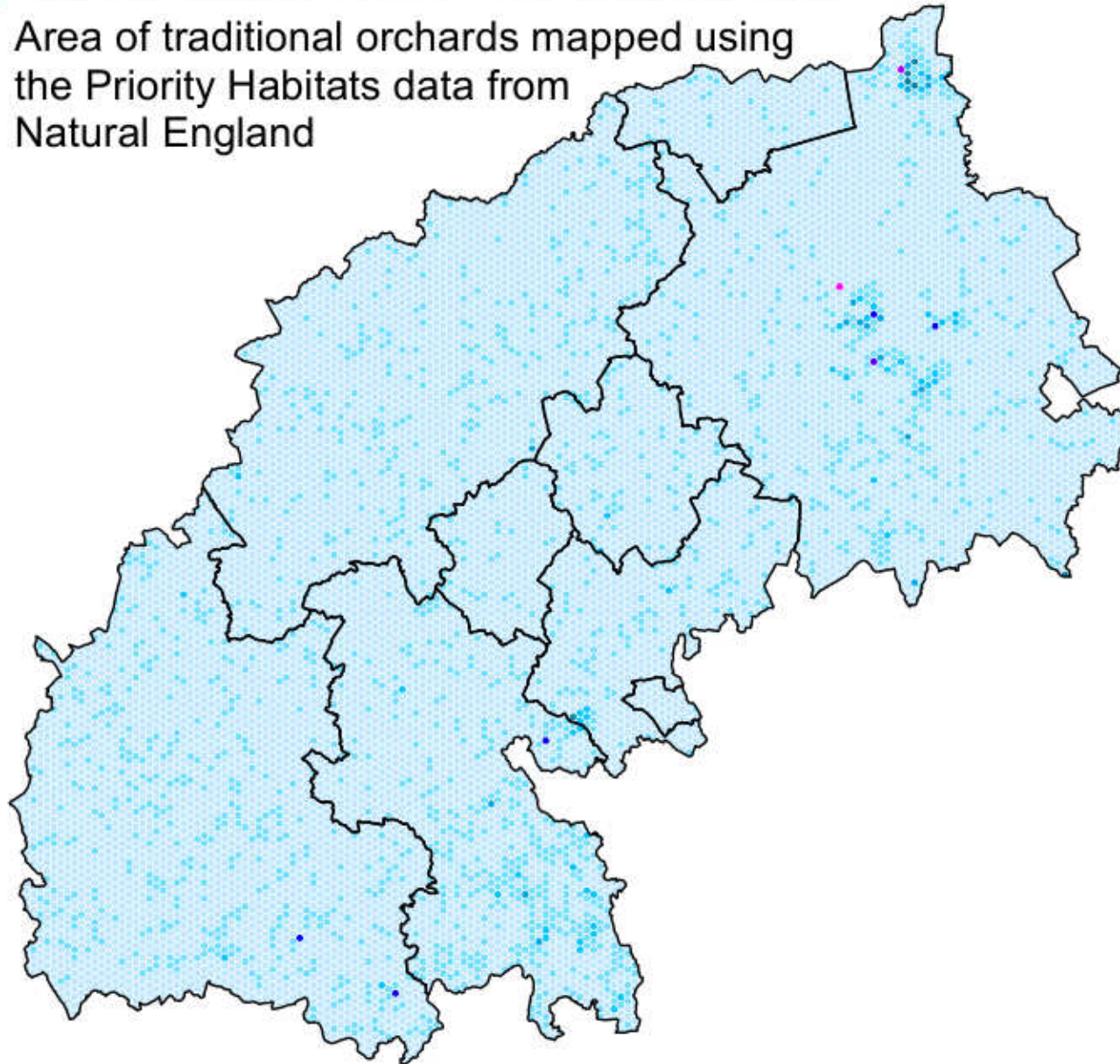
Hexagon values: 0 – 0 km sq



Asset Quantity - Farmland

Traditional Orchards

Area of traditional orchards mapped using the Priority Habitats data from Natural England

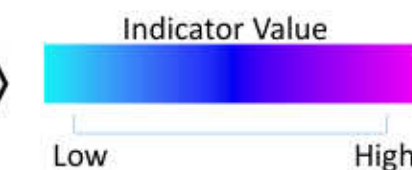


Hexagon values: 0 – 0.31 km sq

Ecosystems Services Key

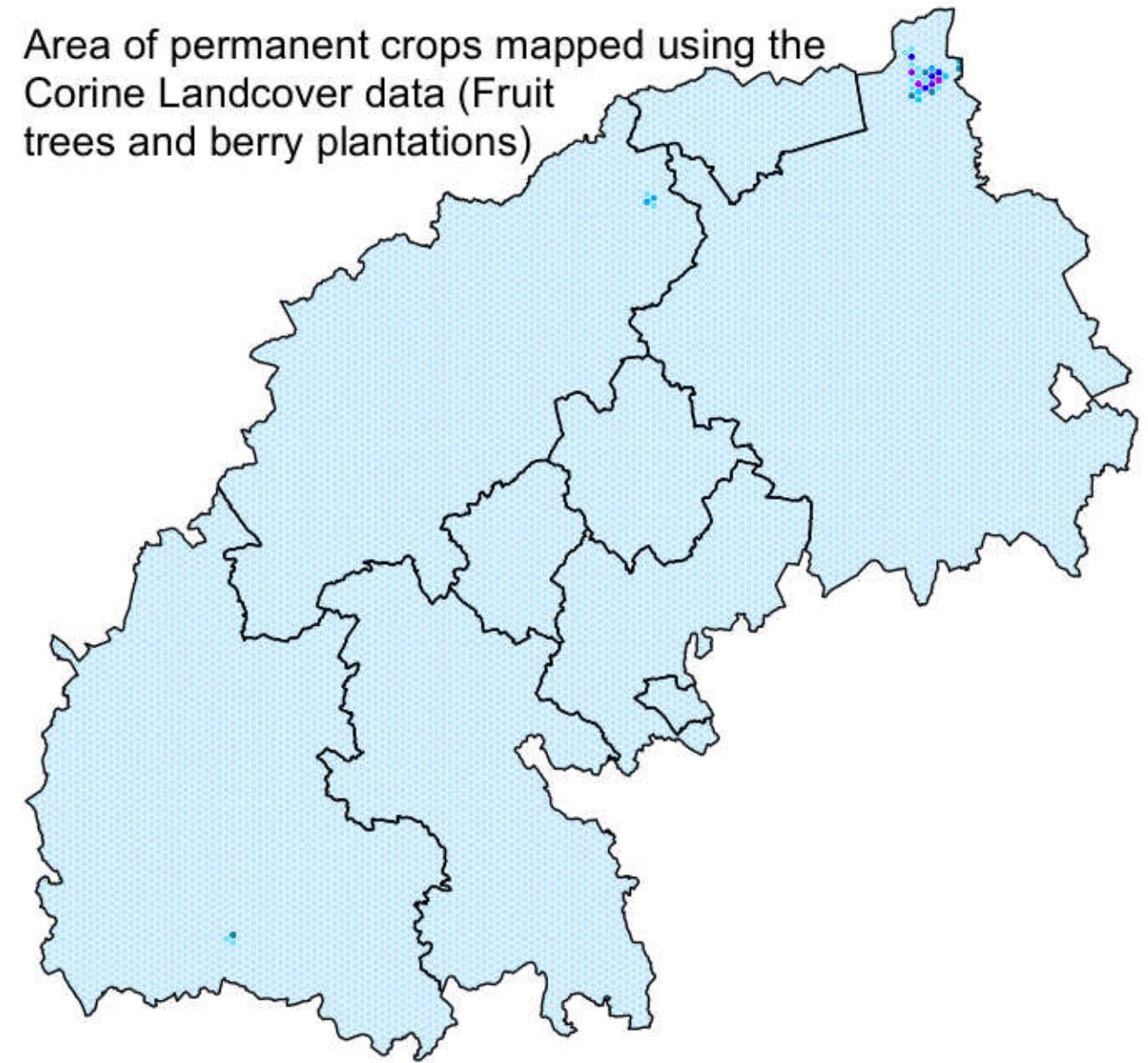
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
 Materials from plants, animals and algae	 Water quality	 Cultural services
 Wild animals, plants, algae and outputs	 Air quality	
 Plant-based energy	 Noise regulation	
 Aquaculture	 Mass stabilisation	
 Cultivated crops	 Flood protection	
 Water supply	 Pollination and seed dispersal	
 Reared animals and outputs	 Maintenance of nursery pops and habitats	
	 Pest and disease control	
	 Climate regulation	



Permanent Crops

Area of permanent crops mapped using the Corine Landcover data (Fruit trees and berry plantations)



Hexagon values: 0 – 0.84 km sq

Asset Quantity: Grassland & Heath



Grassland habitats comprise almost 40% of England's landcover (CEHLCM 2015), taking a variety of forms ranging from rough moorland grazing to urban parks and gardens. Semi-natural grasslands provide a range of ecosystem services, primarily related to livestock production and cultural heritage. Semi-natural grasslands also provide open space for recreation and exercise, yielding physical and mental benefits for visitors and residents, as well as potential economic gain.

Mountains, moorlands and heaths cover 18% of the UK's land area (CEHLCM, 2015) and range from highly fragmented lowland heaths to upland moors and heathland. They provide a wide range of ecosystem services including food provision and the regulation of water quality and river flows, as well as a host of cultural, historical and recreational services.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

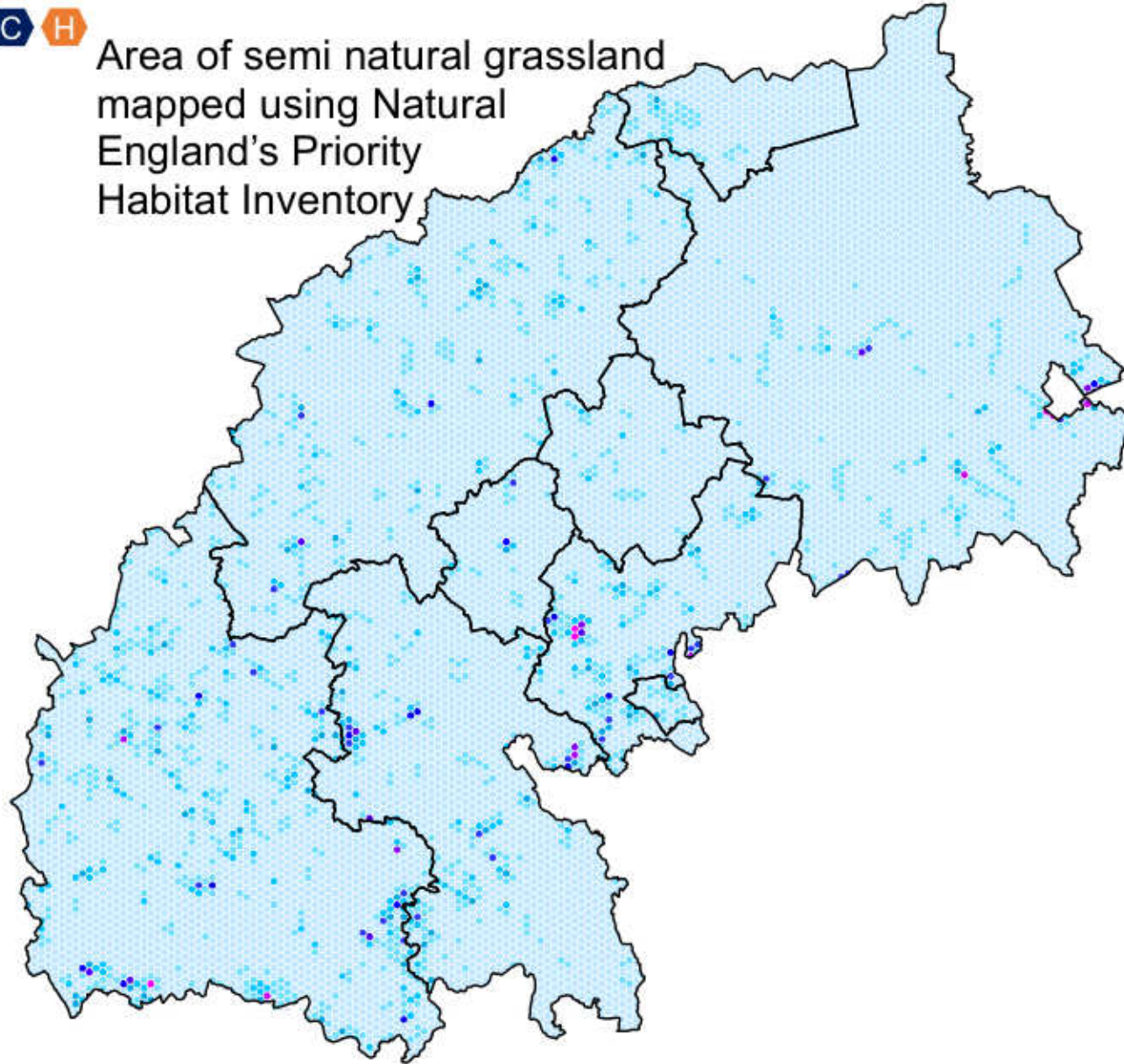
The water quality, flood protection and water supply ecosystem services have been assessed on a whole hydrological catchment basis.

Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Semi natural grasslands						X	X	X				X	X	X		X	X	
Lowland meadows	X					X	X	X				X	X	X		X	X	
Lowland heath						X	X	X			X	X		X		X	X	

Asset Quantity - Grassland & Heath

Semi Natural Grassland

Area of semi natural grassland mapped using Natural England's Priority Habitat Inventory

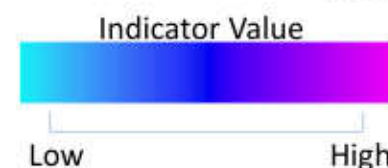


Hexagon values: 0 – 0.72 km sq

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

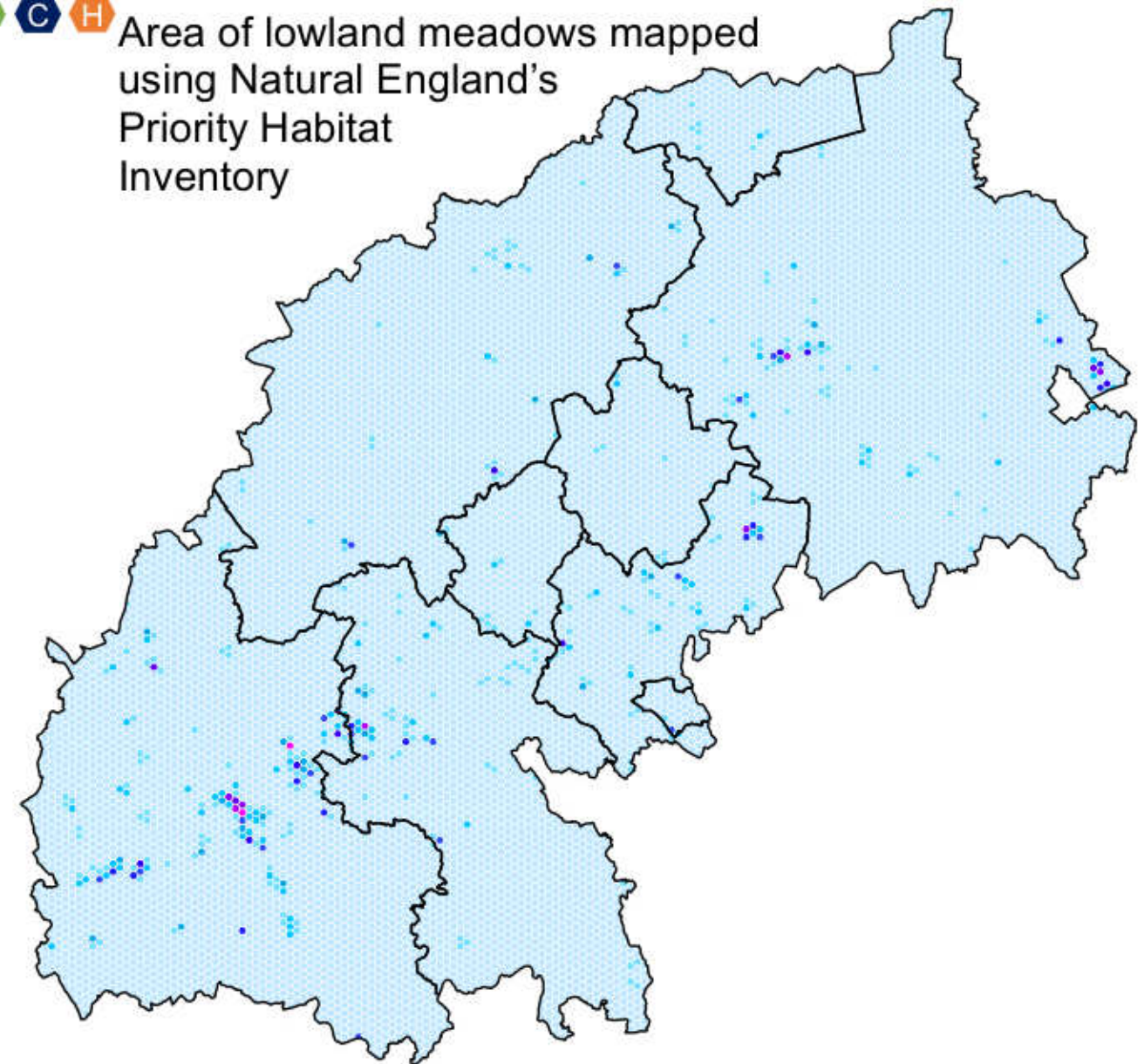
Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



Local Natural Capital Plan

Lowland Meadows

Area of lowland meadows mapped using Natural England's Priority Habitat Inventory

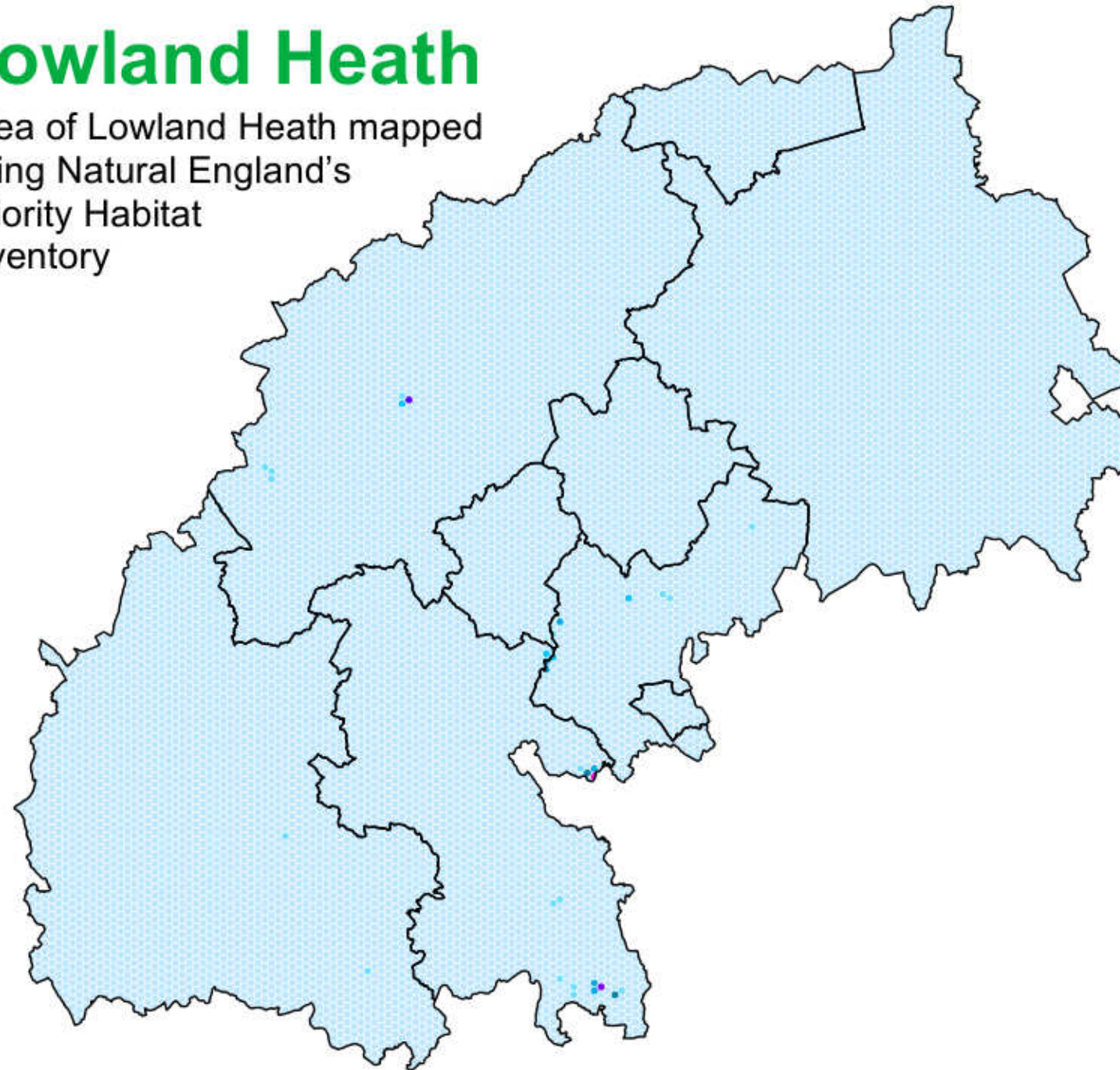


Hexagon values: 0 – 0.60 km sq

Asset Quantity - Grassland & Heath

Lowland Heath

Area of Lowland Heath mapped using Natural England's Priority Habitat Inventory



Hexagon values: 0 – 0.35 km sq

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



Asset Quantity: Woodland



Woodland occupies 1.3 million hectares (12.5%) of England's land cover, of which 74% is broadleaved and 26% is coniferous (Forestry Research, 2018). Much of this woodland has been subject to extensive management and modification, but none the less still represents very important habitat for a multitude of rare and threatened organisms, such as hazel dormice, lady orchid and scarlet elf cup. Ancient woodlands are especially important, supporting unique, complex and rich ecosystems.

As well as providing habitats for wildlife, woodlands are a vitally important store of carbon, helping to negate the effects of global climate change. Urban woodland can improve air quality by filtering particulate pollutants and can also mitigate noise pollution when appropriately positioned. Woodlands play an important role in water management, helping to improve water quality and alleviate downstream flood risk. Woodland also has immense cultural and recreational value.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

The water quality, flood protection and water supply ecosystem services have been assessed on a whole hydrological catchment basis.

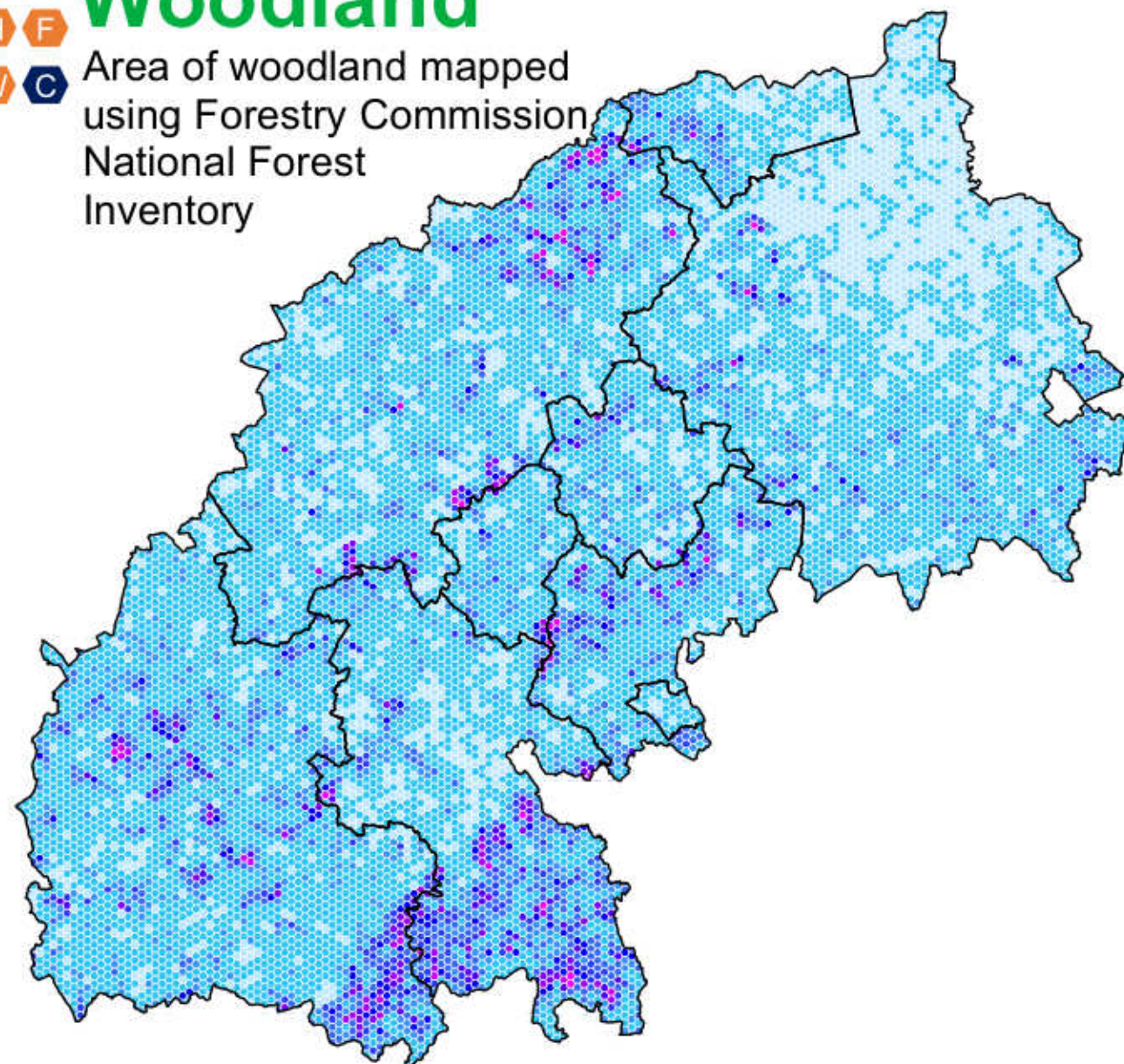
Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Woodland	X	X				X		X	X			X		X		X	X	
Broadleaf and mixed woodland	X	X				X		X	X			X		X		X	X	
Broadleaf	X	X				X		X	X			X		X		X	X	
Conifer	X	X				X		X	X			X				X	X	
Ancient woodland						X		X				X		X		X	X	

Asset Quantity - Woodland



Woodland

Area of woodland mapped using Forestry Commission National Forest Inventory



Hexagon values: 0 – 1 km sq

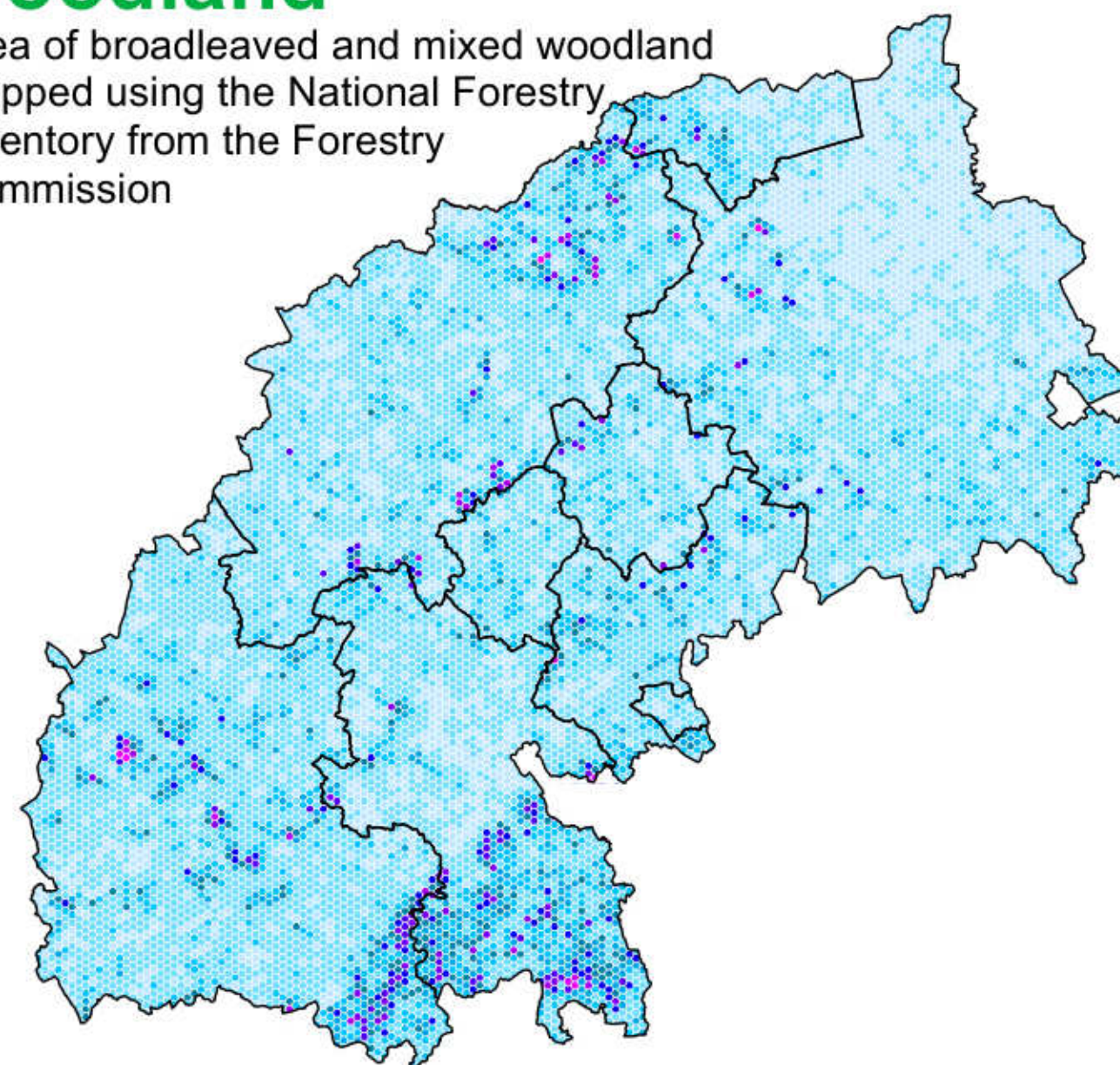
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

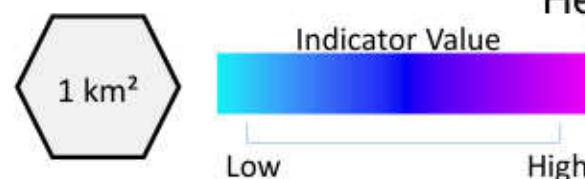
Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

Broadleaved & Mixed Woodland

Area of broadleaved and mixed woodland mapped using the National Forestry Inventory from the Forestry Commission



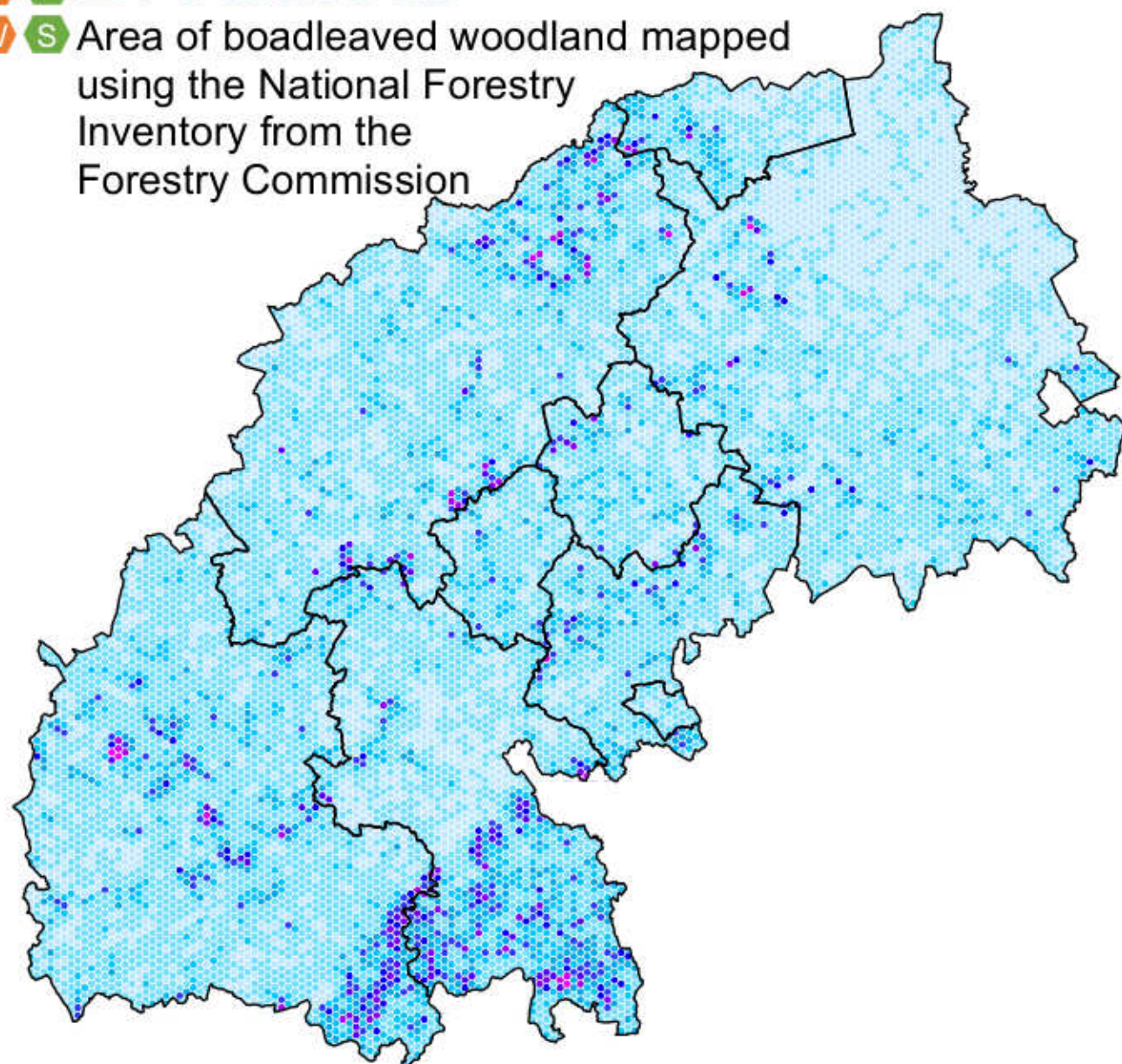
Hexagon values: 0 – 0.93 km sq



Asset Quantity - Woodland

C F A H C M P S Broadleaf

Area of broadleaved woodland mapped using the National Forestry Inventory from the Forestry Commission



Hexagon values: 0 – 0.93 km sq

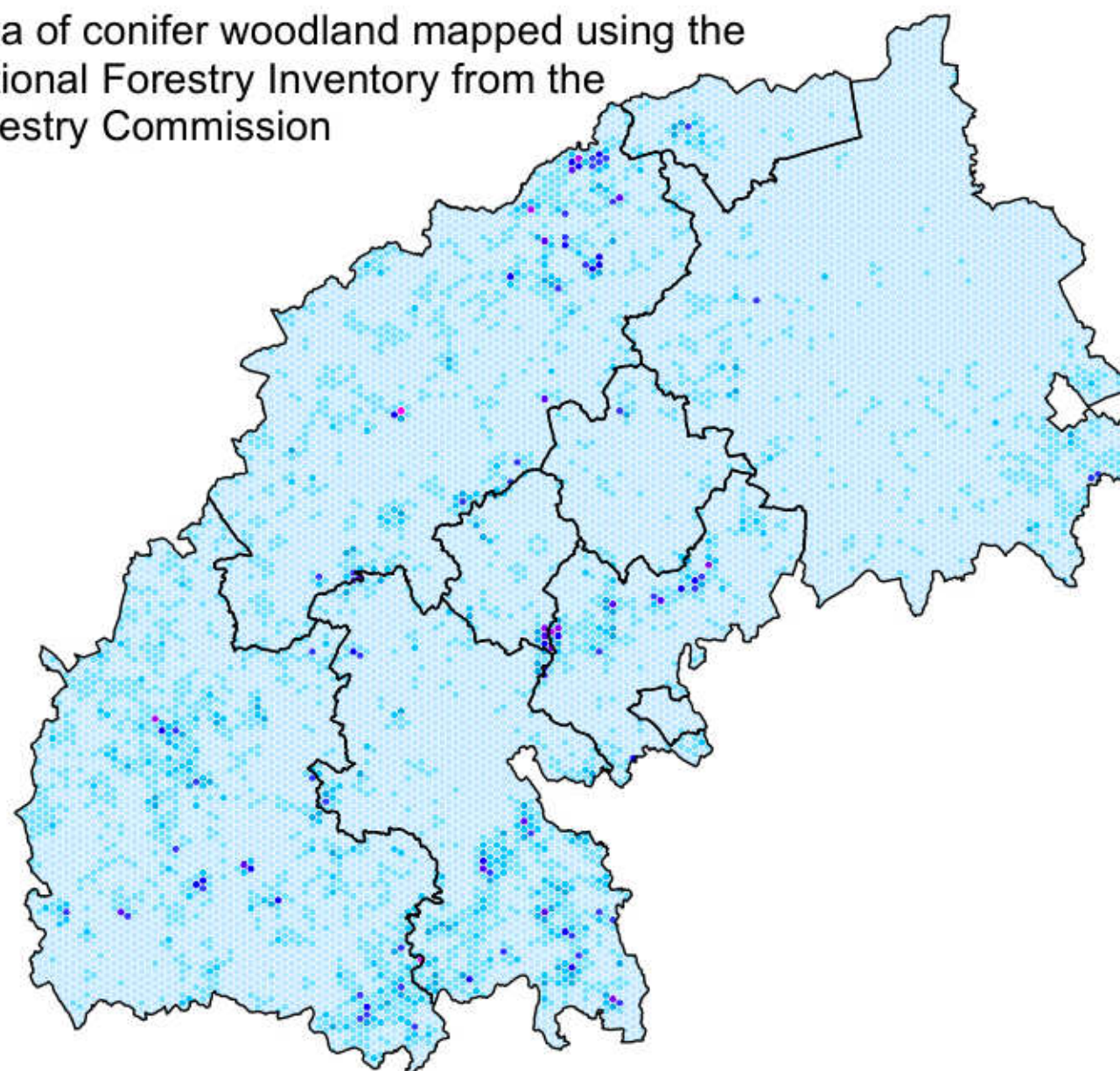
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

C F A H C M P S Conifer

Area of conifer woodland mapped using the National Forestry Inventory from the Forestry Commission



Hexagon values: 0 – 0.71 km sq

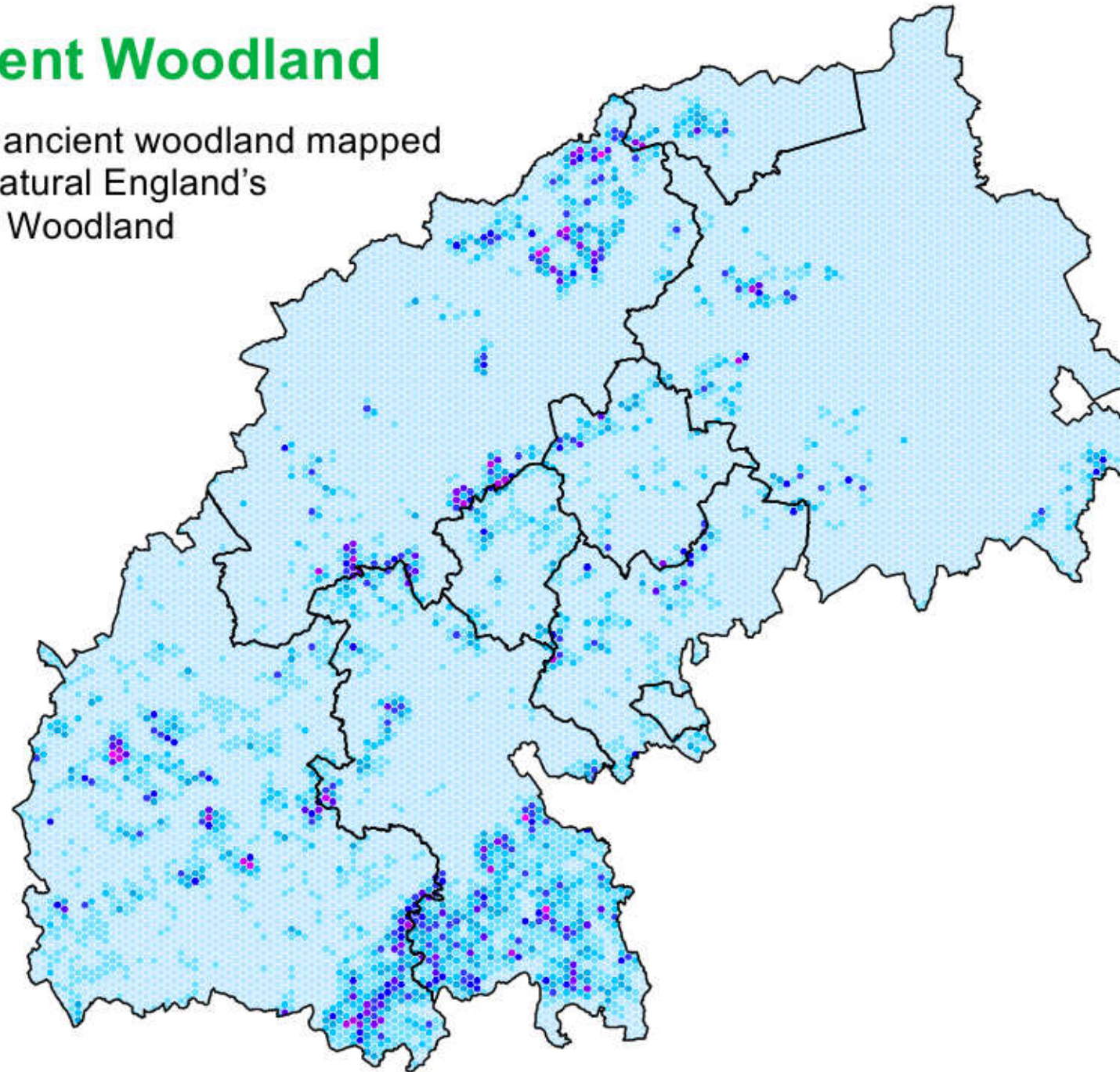


Asset Quantity - Woodland



Ancient Woodland

Area of ancient woodland mapped using Natural England's Ancient Woodland dataset

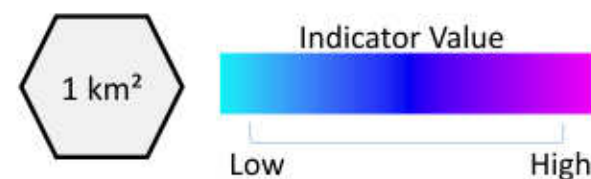


Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

Hexagon values: 0 – 1 km sq



Asset Quantity: Urban



Urban areas in the UK cover just under 7% of land area, yet are home to 8 out of 10 people, often living at extremely high population densities. Pockets of green space assume disproportionate ecological and cultural significance within urban areas. However, urban populations are also dependent on other broad habitats in rural areas for provision of most of their ecosystem services (UKNEA, 2011).

Despite occupying a relatively small area within our towns and cities, the urban natural environment provides a wide range of ecosystem services. Gardens represent a highly heterogeneous urban sub-habitat, supporting a diverse array of plants and animals, and can be particularly important for pollination services. Amenity green spaces (parks, outdoor sports facilities) are vital for community cohesion, and the mental and physical health of urban residents (UKNEA, 2011). Such cultural and recreational services are particularly important in urban areas, where human population density is higher than in all other habitats.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

The water quality, flood protection and water supply ecosystem services have been assessed on a whole hydrological catchment basis.

Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Blue space														X		X	X	
Green space									X	X				X		X	X	
Semi natural habitats						X		X	X	X		X		X		X	X	
Open mosaic habitat														X				
Urban Woodland						X		X	X	X		X		X		X	X	

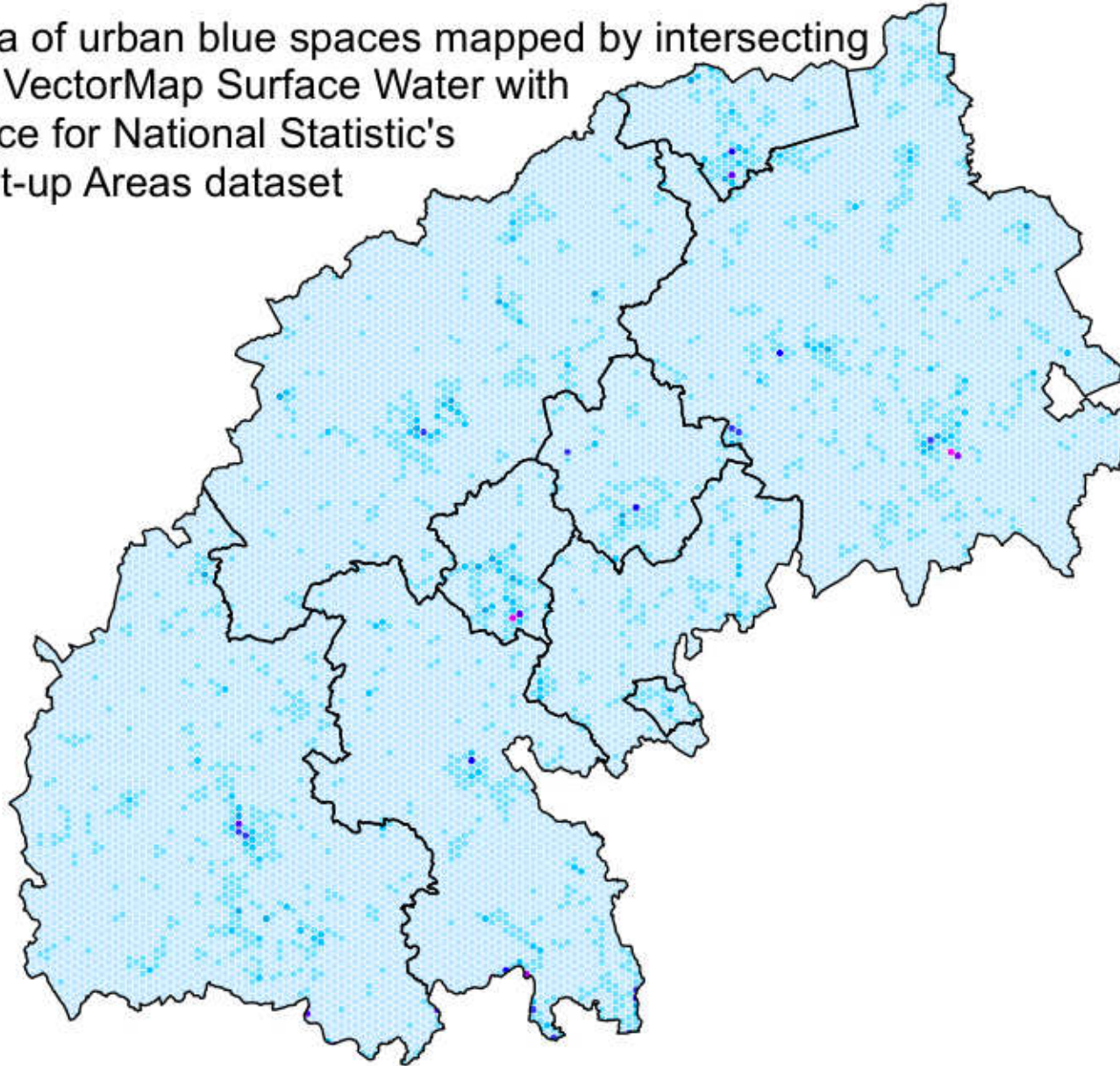
Asset Quantity - Urban



Local Natural Capital Plan

Blue Space

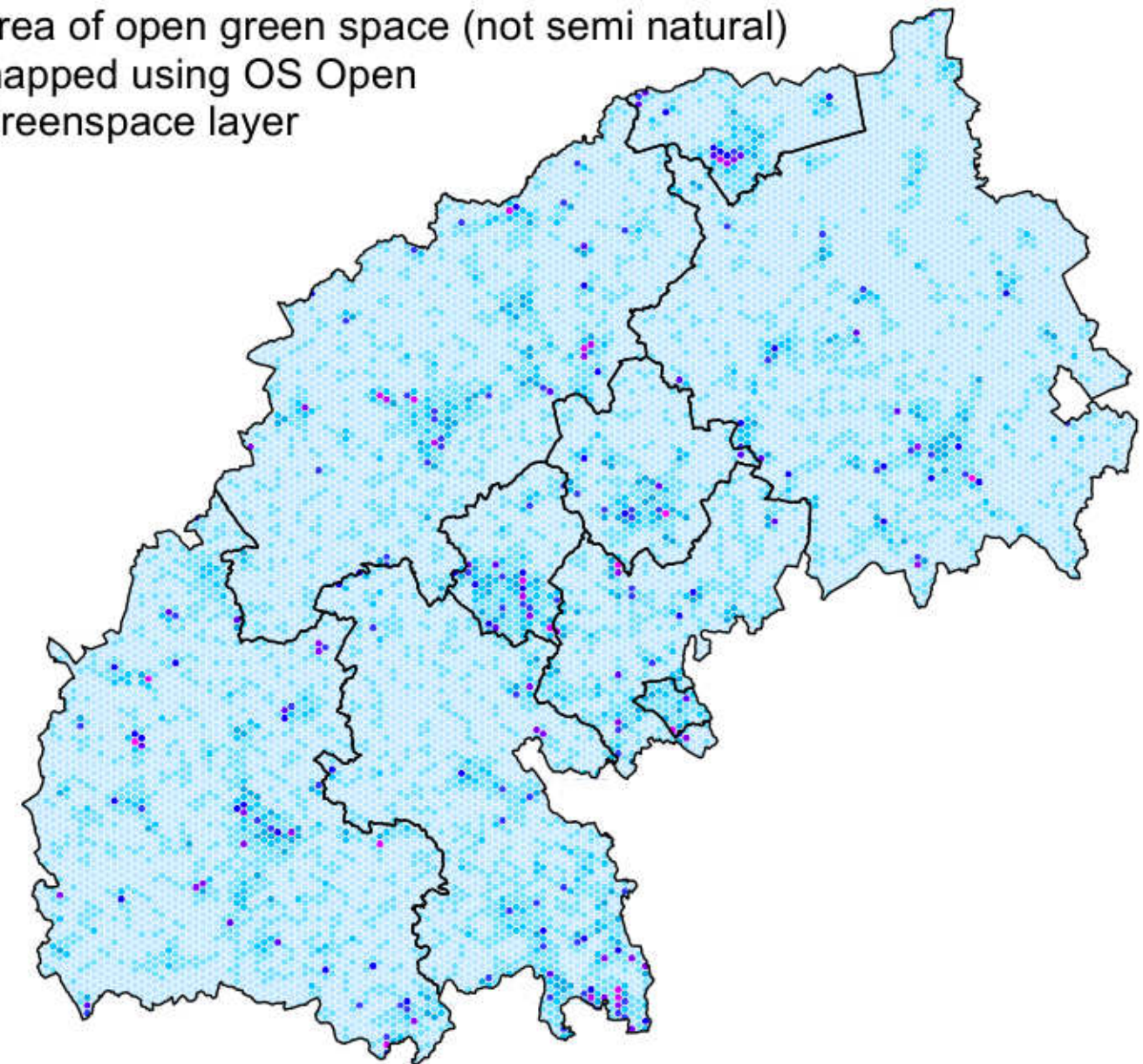
Area of urban blue spaces mapped by intersecting OS VectorMap Surface Water with Office for National Statistics's Built-up Areas dataset



Hexagon values: 0 – 0.10 km sq

Green Space

Area of open green space (not semi natural) mapped using OS Open Greenspace layer

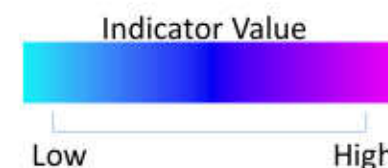


Hexagon values: 0 – 0.94 km sq

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

- | | | |
|--|---|---|
| Provisioning | Regulating | Cultural |
| <ul style="list-style-type: none"> Materials from plants, animals and algae Wild animals, plants, algae and outputs Plant-based energy Aquaculture Cultivated crops Water supply Reared animals and outputs | <ul style="list-style-type: none"> Water quality Air quality Noise regulation Mass stabilisation Flood protection Pollination and seed dispersal Maintenance of nursery populations and habitats Pest and disease control Climate regulation | <ul style="list-style-type: none"> Cultural services |



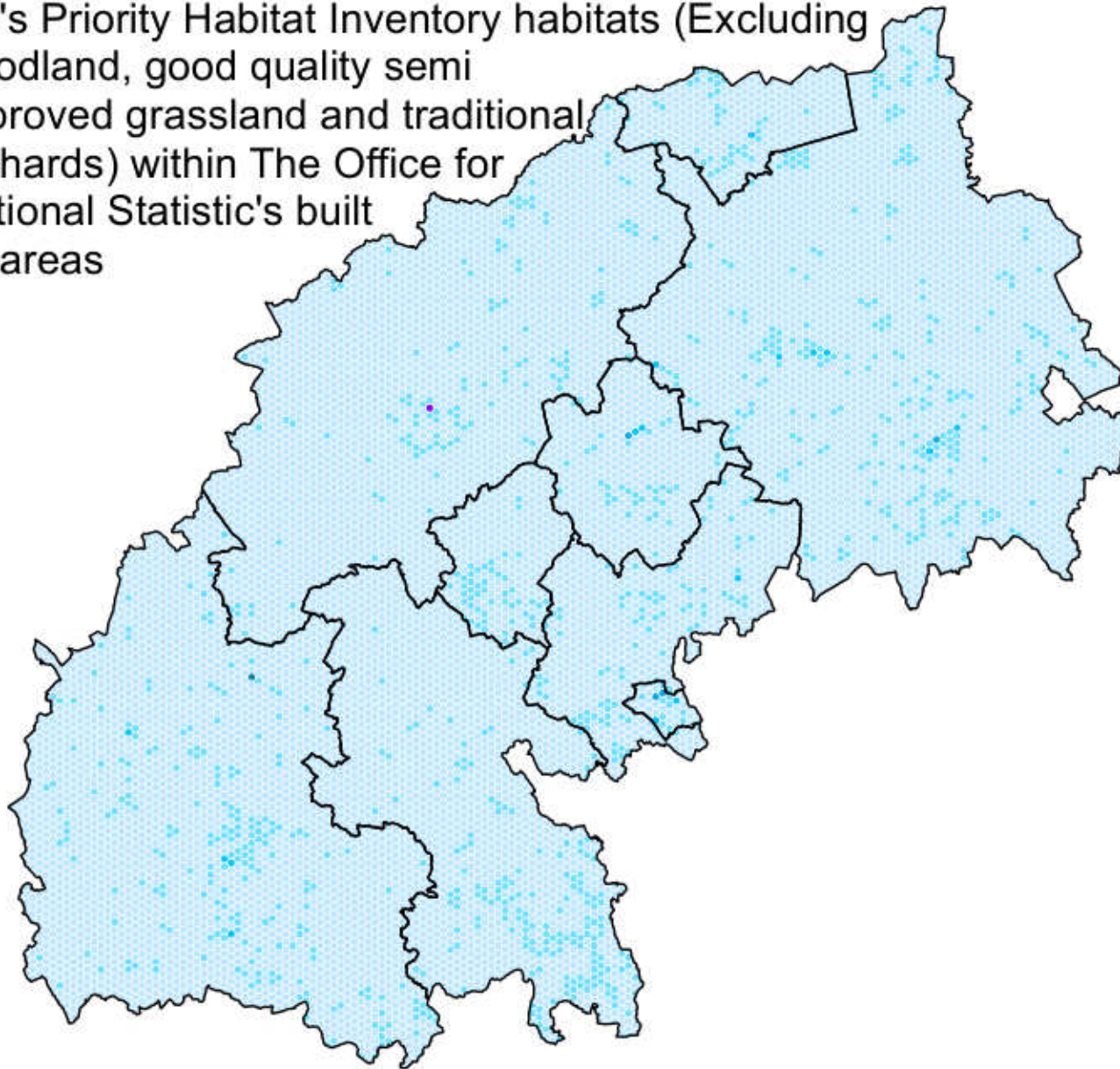
Asset Quantity - Urban



Local Natural Capital Plan

SACSHN Semi Natural habitats

Area of urban semi natural habitats mapped by intersecting NE's Priority Habitat Inventory habitats (Excluding woodland, good quality semi improved grassland and traditional orchards) within The Office for National Statistic's built up areas



Hexagon values: 0 – 0.55 km sq

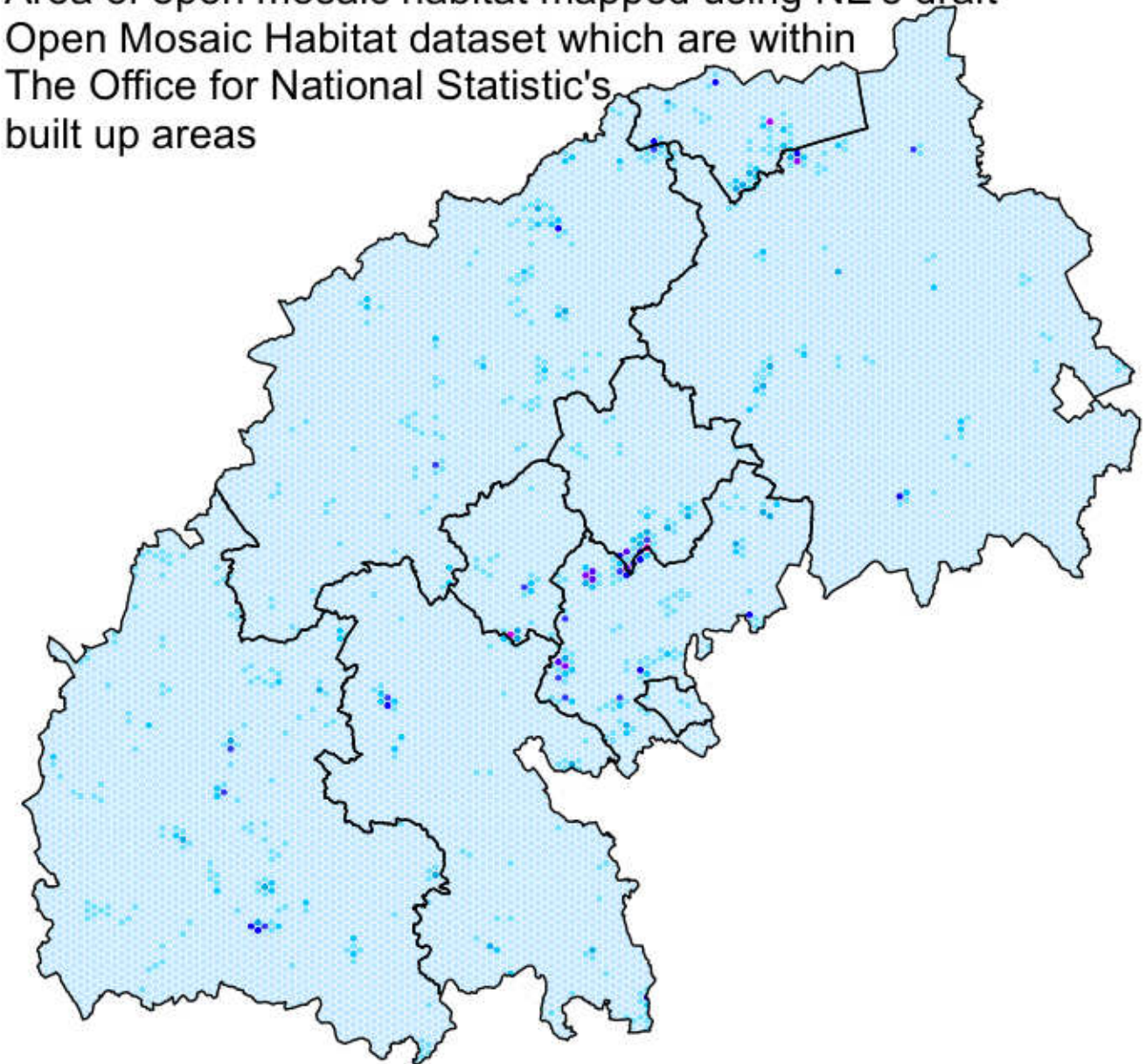
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

Open Mosaic Habitat

Area of open mosaic habitat mapped using NE's draft Open Mosaic Habitat dataset which are within The Office for National Statistic's built up areas



Hexagon values: 0 – 0.82 km sq

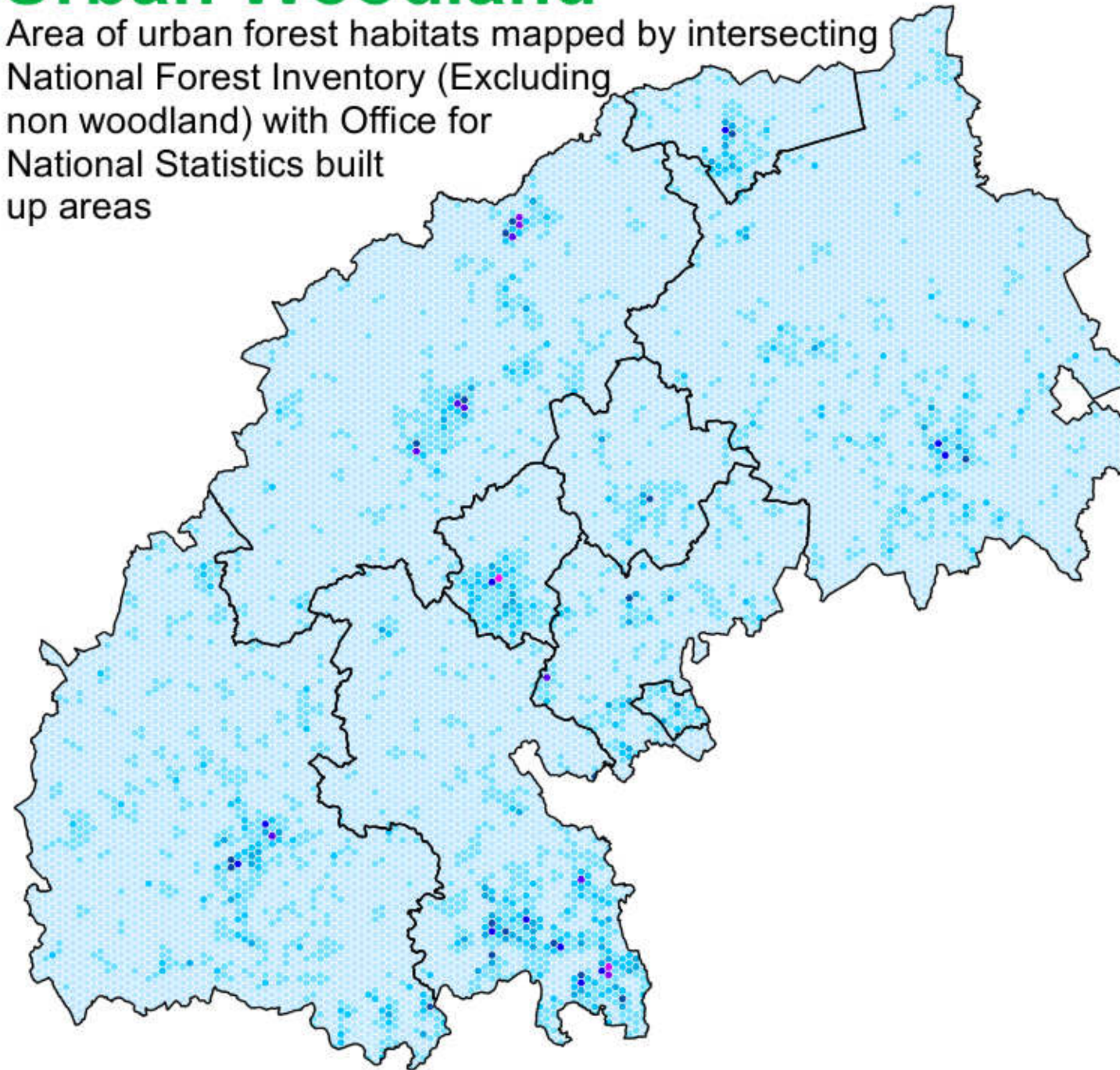


Asset Quantity - Urban



Urban Woodland

Area of urban forest habitats mapped by intersecting National Forest Inventory (Excluding non woodland) with Office for National Statistics built up areas



Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning

- Materials from plants, animals and algae
- Wild animals, plants, algae and outputs
- Plant-based energy
- Aquaculture
- Cultivated crops
- Water supply
- Reared animals and outputs

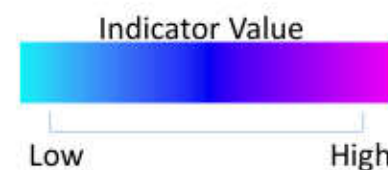
Regulating

- Water quality
- Air quality
- Noise regulation
- Mass stabilisation
- Flood protection
- Pollination and seed dispersal
- Maintenance of nursery populations and habitats
- Pest and disease control
- Climate regulation

Cultural

- Cultural services

Hexagon values: 0 – 0.34 km²





**Asset
Quality**

Asset Quality: Hydrology & Geomorphology



The hydrology and geomorphology of habitats influence their ability to provide ecosystem services and subsequently impacts the benefits received by society. Hydrology relates to the movement of water over and through a habitat, while geomorphology refers to topographic and geological features of a landscape. Hydrology and geomorphology indicators are important because they relate to the processes, distribution and effects of water, the water cycle and sediment processes.

Hydrology and geomorphology have wide-ranging effects on the delivery of ecosystem services. Water supply is affected by the naturalness of aquifer function and river flow regime. River channel obstruction may block the migration of diadromous fishes and channel modification may lead to the loss of fish nursery habitat. Flooding maybe mitigated or worsened by the relief or underlying geology of a catchment or by river engineering

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

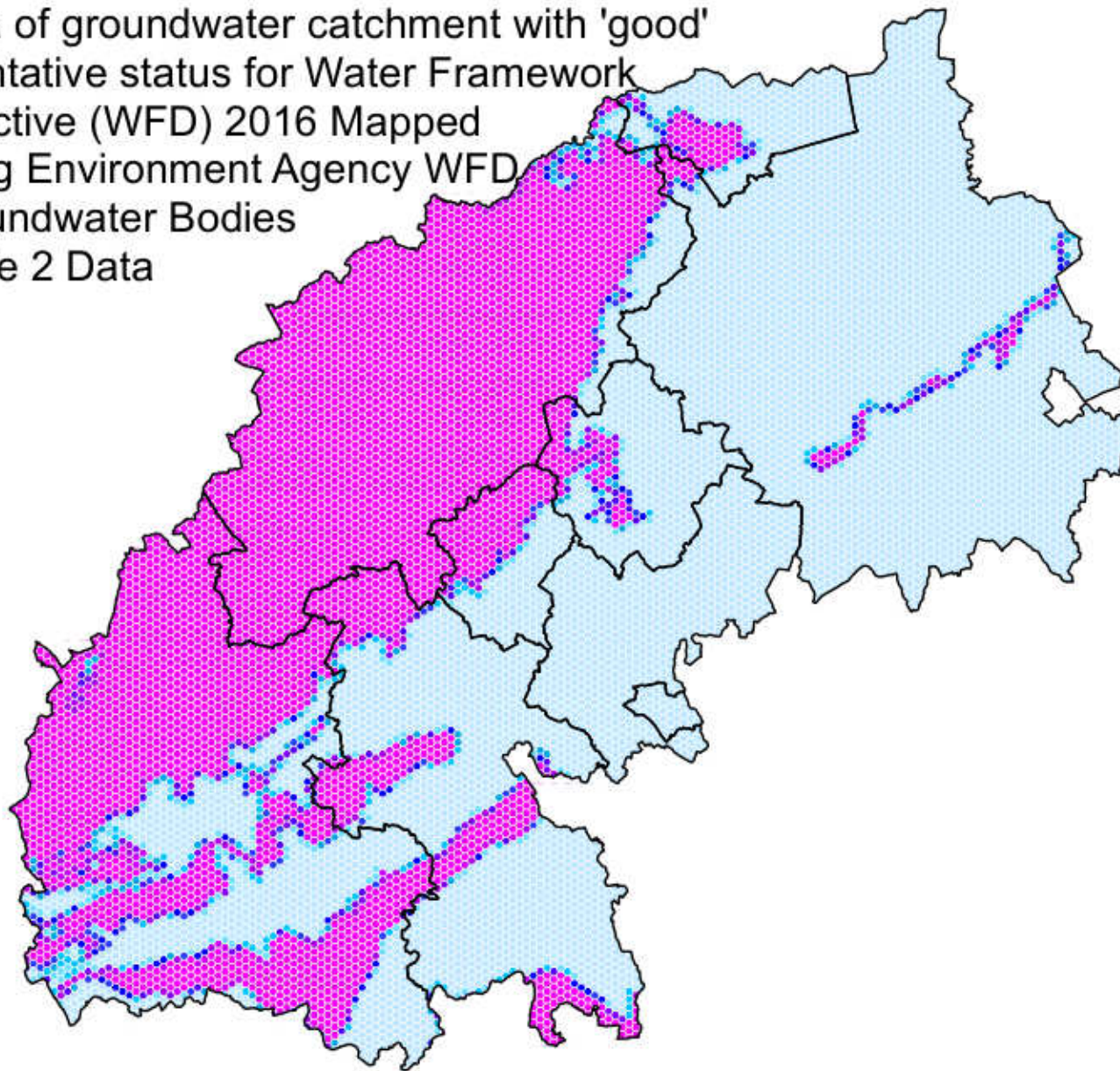
Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Natural aquifer function						X						X						
Naturalness of flow regime						X												
Lack of physical modifications of waterbodies												X		X		X	X	

Asset Quality - Hydrology & Geomorphology



S F Natural Aquifer Function

Area of groundwater catchment with 'good' quantitative status for Water Framework Directive (WFD) 2016 Mapped using Environment Agency WFD Groundwater Bodies Cycle 2 Data



Hexagon values: 0 – 1 km sq

Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

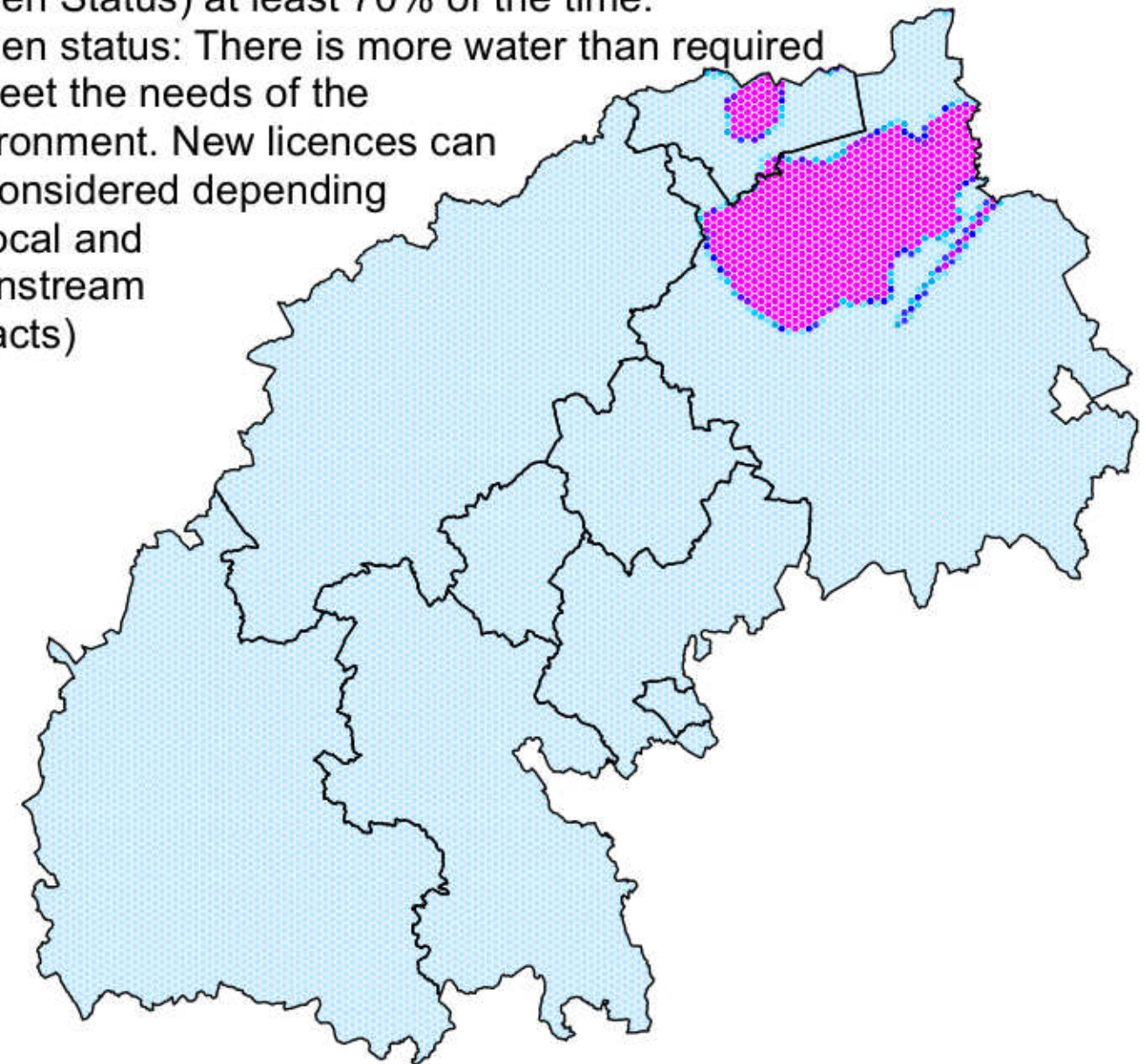
Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



S Naturalness of flow regime

Area of land where surface water is available for abstraction (Green Status) at least 70% of the time.

(Green status: There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts)

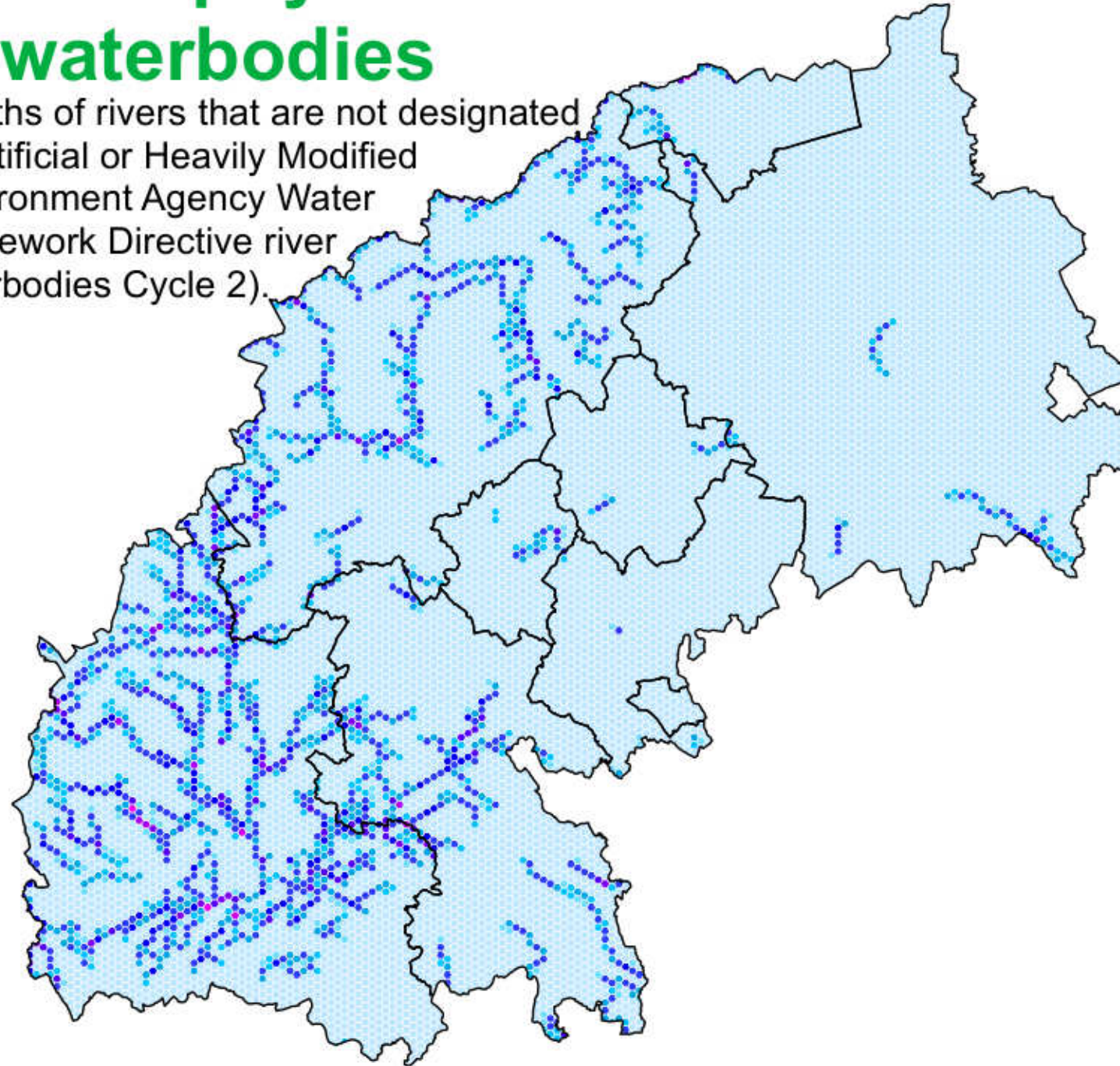


Hexagon values: 0 – 1 km sq

Asset Quality

Lack of physical modifications of waterbodies

Lengths of rivers that are not designated as Artificial or Heavily Modified (Environment Agency Water Framework Directive river waterbodies Cycle 2).



Hexagon values: 0 – 3.70 km



Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning

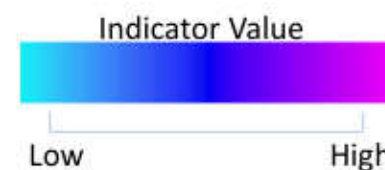
Regulating

Cultural

-  Materials from plants, animals and algae
-  Wild animals, plants, algae and outputs
-  Plant-based energy
-  Aquaculture
-  Cultivated crops
-  Water supply
-  Reared animals and outputs

-  Water quality
-  Air quality
-  Noise regulation
-  Mass stabilisation
-  Flood protection
-  Pollination and seed dispersal
-  Maintenance of nursery populations and habitats
-  Pest and disease control
-  Climate regulation

-  Cultural services



Hexagon values: 0 – 1.84 km

Asset Quality: Nutrient & Chemical Status



The nutrient and chemical status of habitats influence their ability to provide ecosystem services and subsequently impacts benefits received by society. Nutrient and chemical factors encompass the availability of innumerable elements and compounds in water and soil / sediment.

In fresh water habitats, for example, excess nitrate and phosphate leads to eutrophication, with a potentially deleterious impact on biodiversity. Nitrogen and phosphate levels also affect the processing of potable water at treatment plants. In terrestrial habitats, the availability of nitrogen, phosphorus and potassium are vital to primary production, thus affecting the provision of food and raw materials. Nutrient and chemical status also influences waste decomposition, climate regulation and the purification of water and air.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

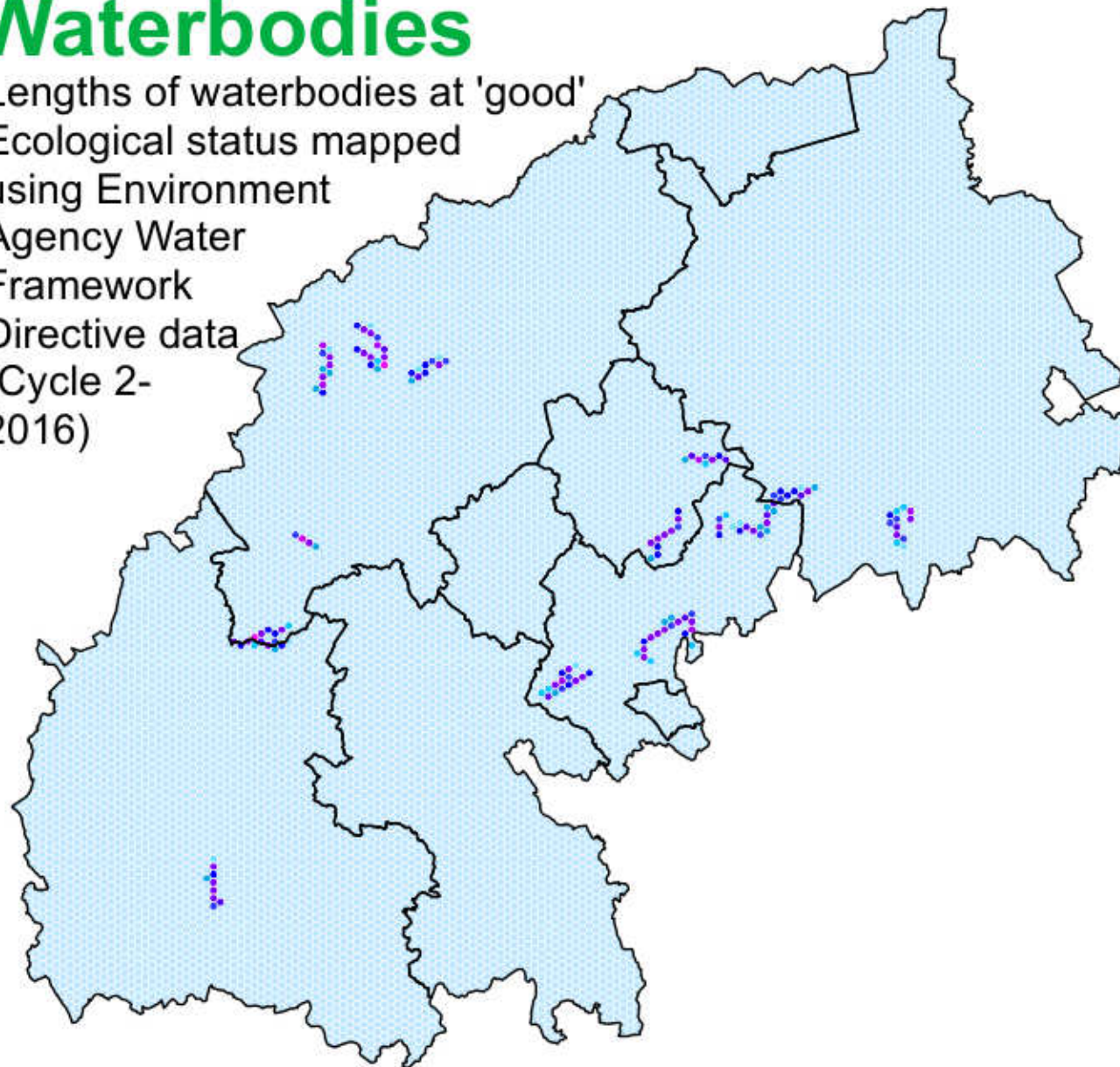
Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Ecological status of waterbodies						X		X						X				
Chemical status of Waterbodies			X	X				X						X				
Ecological and chemical status of waterbodies						X		X						X			X	

Asset Quality - Nutrient & Chemical Status



SWH Ecological status of Waterbodies

Lengths of waterbodies at 'good' Ecological status mapped using Environment Agency Water Framework Directive data (Cycle 2-2016)



Hexagon values: 0 – 1.84 km

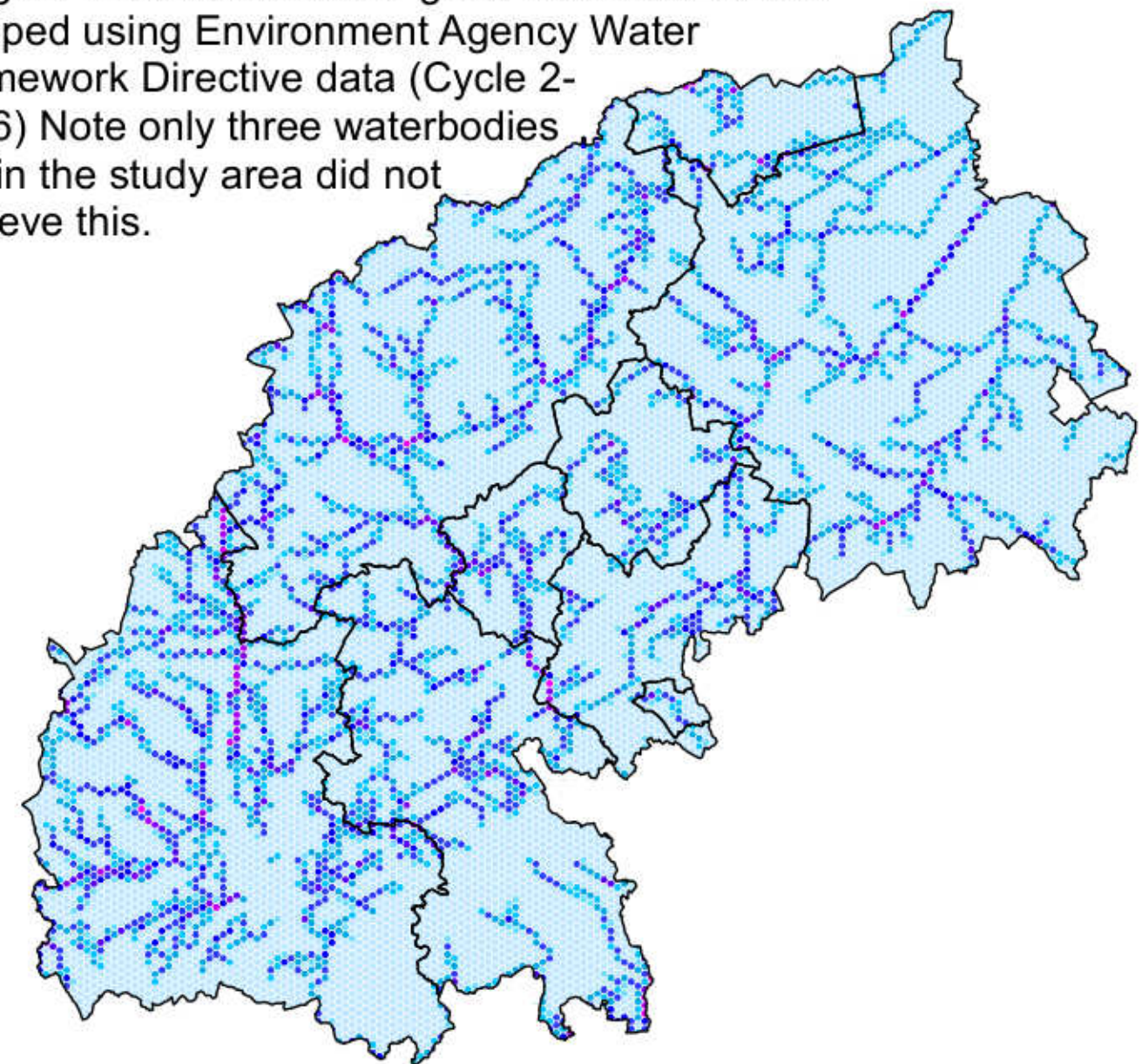
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

- | | | |
|--|---|---|
| Provisioning | Regulating | Cultural |
| <ul style="list-style-type: none"> Materials from plants, animals and algae Wild animals, plants, algae and outputs Plant-based energy Aquaculture Cultivated crops Water supply Reared animals and outputs | <ul style="list-style-type: none"> Water quality Air quality Noise regulation Mass stabilisation Flood protection Pollination and seed dispersal Maintenance of nursery populations and habitats Pest and disease control Climate regulation | <ul style="list-style-type: none"> Cultural services |

WAH Chemical Status of Waterbodies

Lengths of waterbodies at 'good' chemical status mapped using Environment Agency Water Framework Directive data (Cycle 2-2016) Note only three waterbodies within the study area did not achieve this.



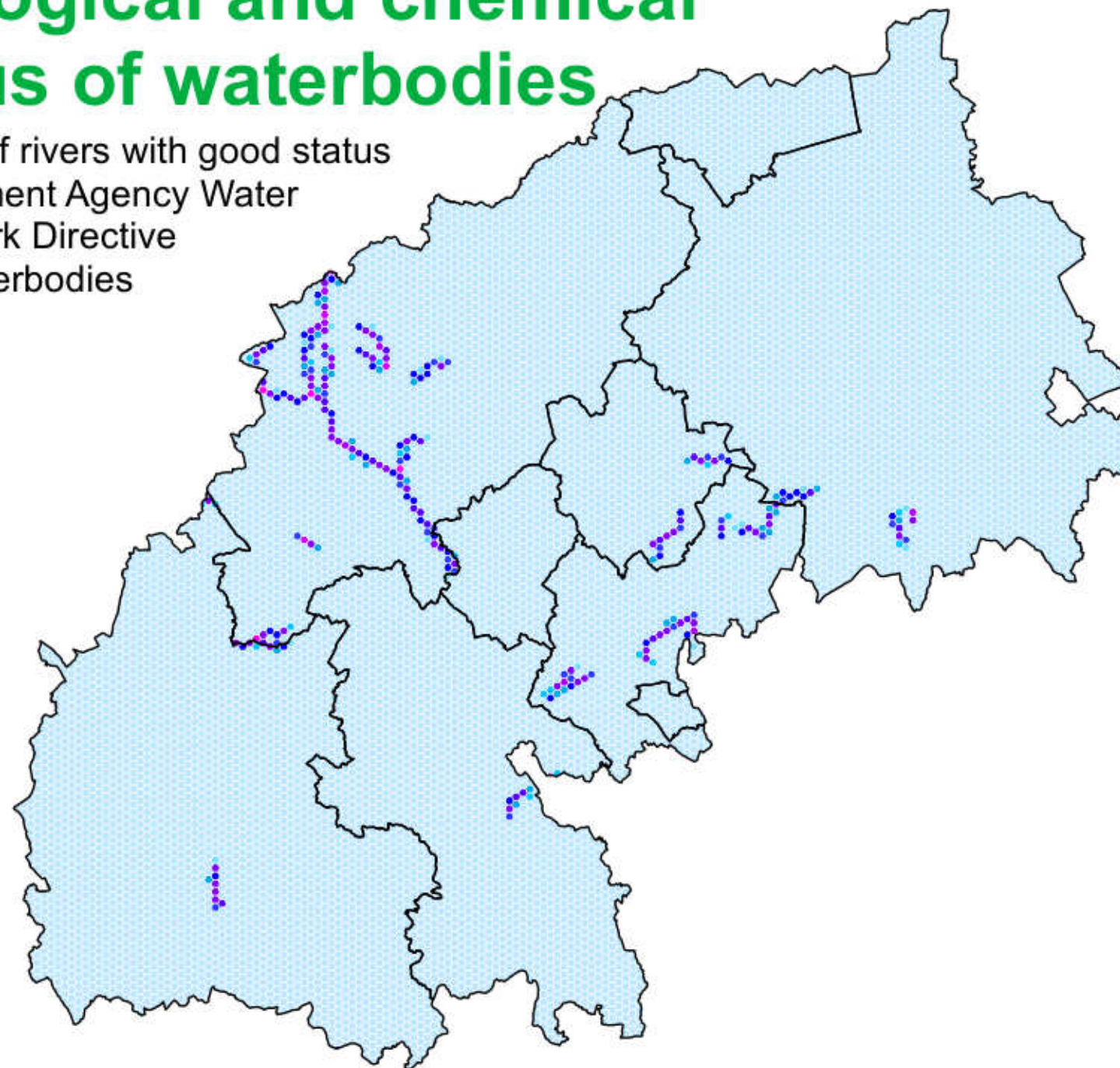
Hexagon values: 0 – 3.91 km



Asset Quality - Nutrient & Chemical Status

Ecological and chemical status of waterbodies

Lengths of rivers with good status
(Environment Agency Water Framework Directive River waterbodies Cycle 2)



Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning

Regulating

Cultural

- Materials from plants, animals and algae
- Wild animals, plants, algae and outputs
- Plant-based energy
- Aquaculture
- Cultivated crops
- Water supply
- Reared animals and outputs

- Water quality
- Air quality
- Noise regulation
- Mass stabilisation
- Flood protection
- Pollination and seed dispersal
- Maintenance of nursery populations and habitats
- Pest and disease control
- Climate regulation

- Cultural services



Indicator Value

Low

High

Asset Quality: Soil / Sediment Processes



The soil / sediment processes that occur in habitats influence their ability to provide ecosystem services and subsequently impacts the benefits received by society. Soil / sediment processes influence factors such as peat depth, organic matter content and soil structure.

Density of carbon / organic matter in top soil is of vital importance to the production of both cultivated crops and natural vegetation, due to its role as the primary energy source in soils. As soil carbon is the biosphere's largest carbon reservoir, soils also play a vital role in climate regulation.

This suite of maps was not produced by the Local Natural Capital Plan team, instead they are a subset and are cut from the maps produced through a collaboration between Natural England and CEH ([Link](#)). The maps are based on broad habitats and expert opinion (from the UK National Ecosystem Assessment) on their importance for the provision of individual ecosystem services. This simple and transparent approach mapped broad habitats as natural capital.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

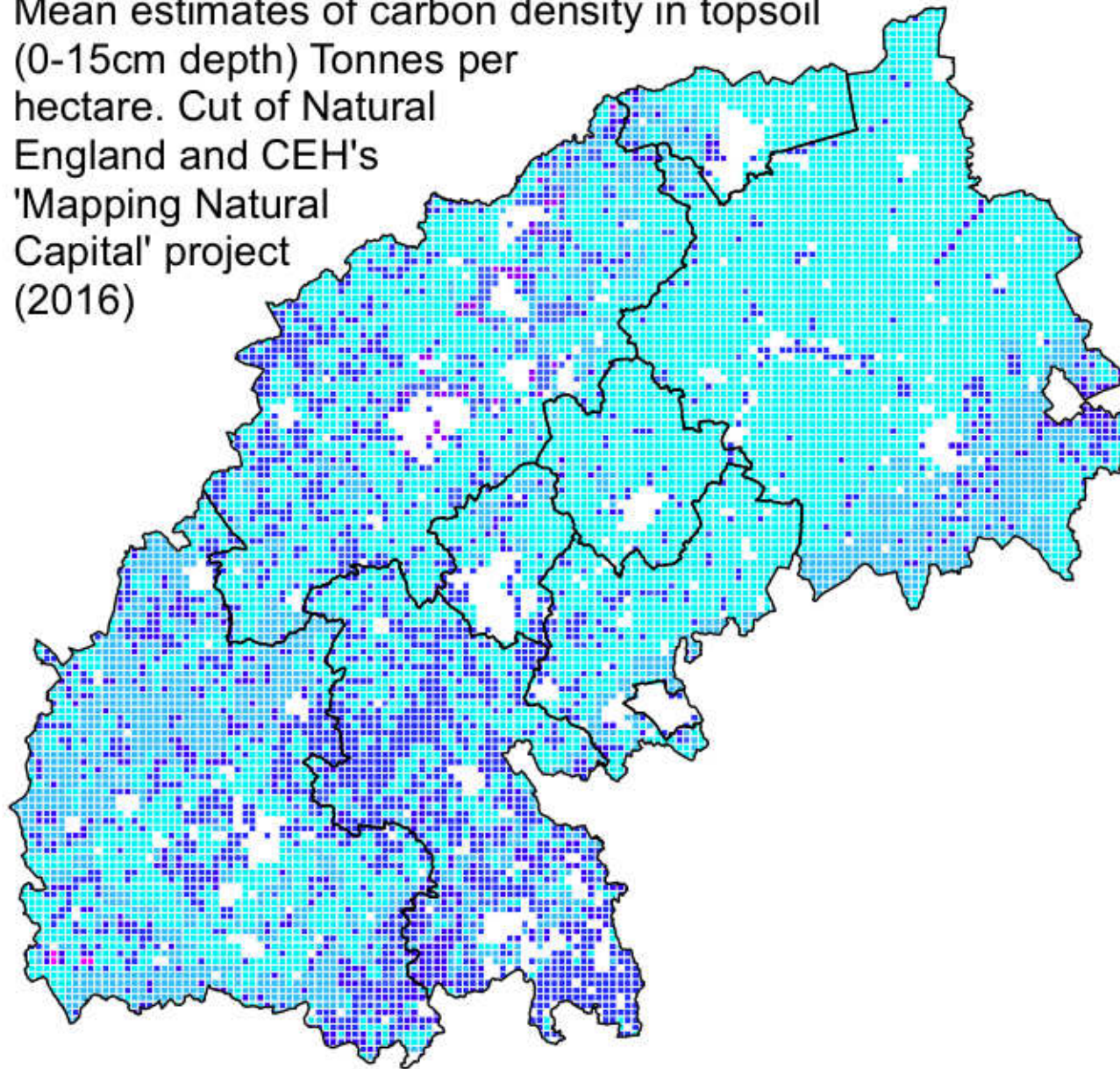
Natural Capital Indicator	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Soil Carbon					X			X			X			X		X		
Soil Nitrogen					X		X	X						X		X		
Soil Biota			X		X		X							X	X	X		
Soil pH																		

Asset Quality

Soil / Sediment Processes

C W H M C Soil Carbon

Mean estimates of carbon density in topsoil (0-15cm depth) Tonnes per hectare. Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



Grid values: 45 – 102

Ecosystems Services Key

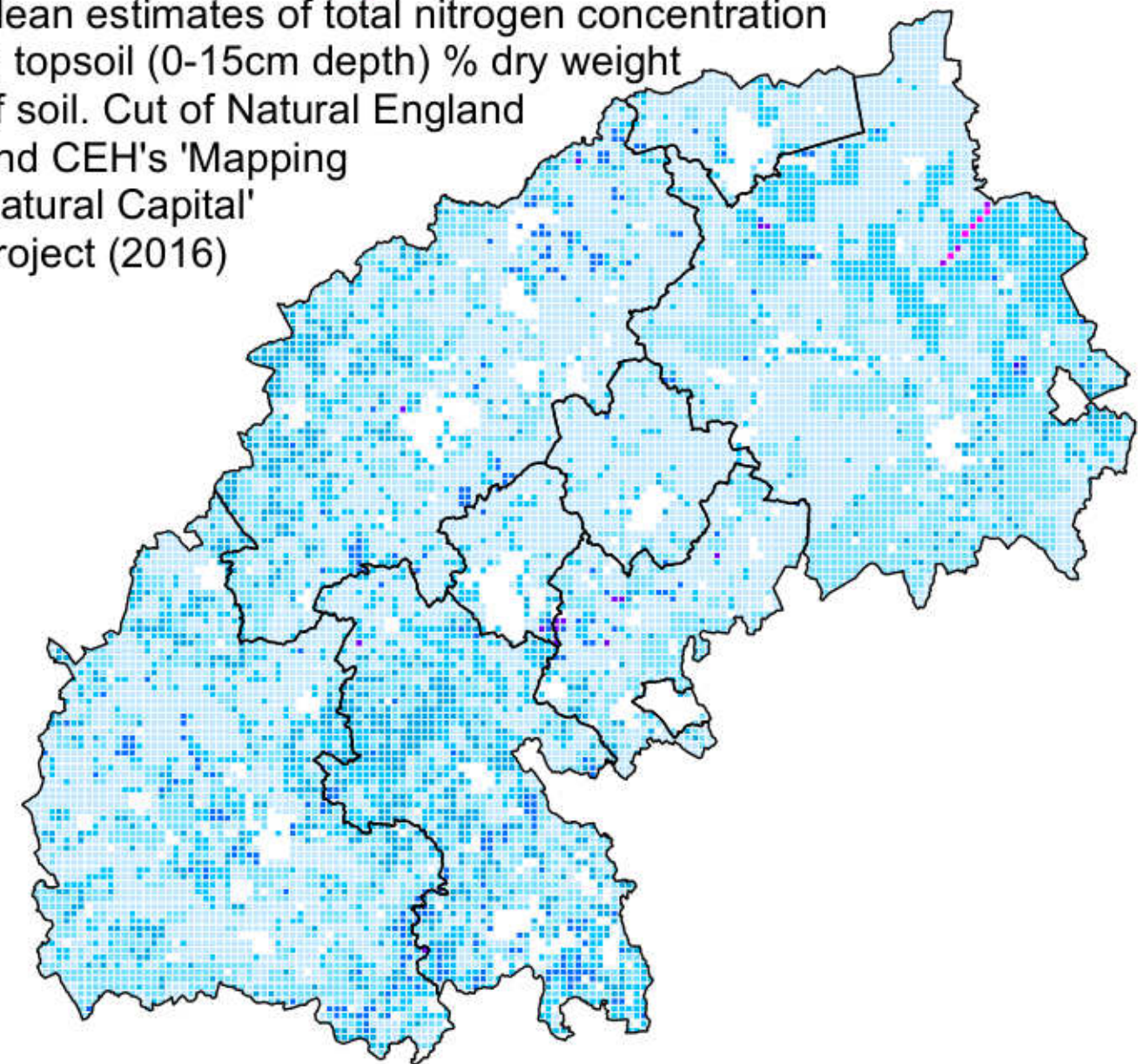
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



C H R C Soil Nitrogen

Mean estimates of total nitrogen concentration in topsoil (0-15cm depth) % dry weight of soil. Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



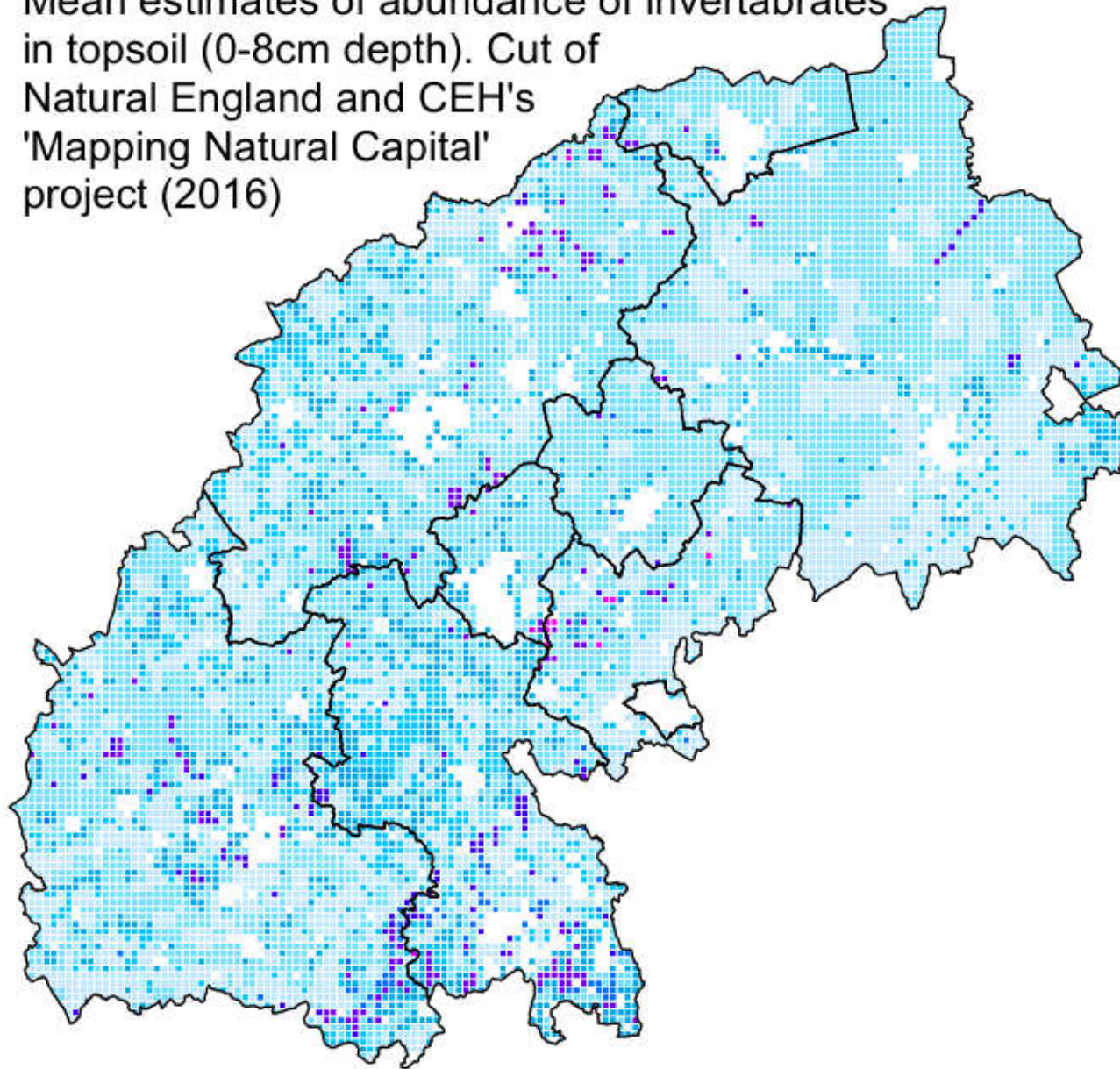
Grid values: 0.17 – 1.21

Asset Quality

Soil / Sediment Processes

Soil Biota

Mean estimates of abundance of invertebrates in topsoil (0-8cm depth). Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



Grid values: 11.31 – 160.9

Ecosystems Services Key

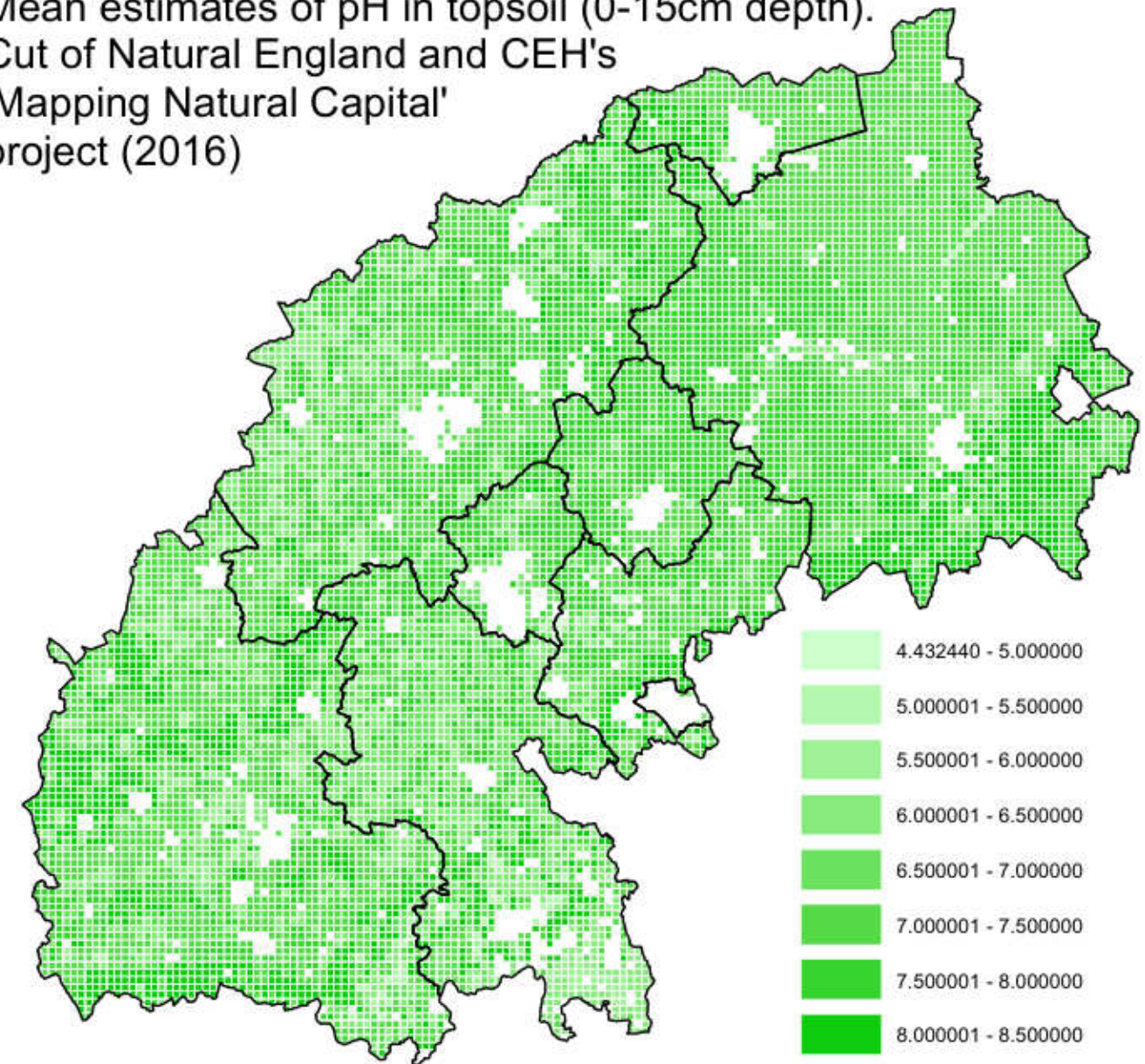
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

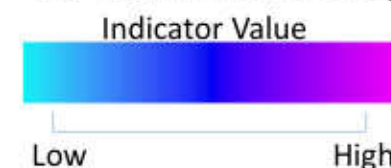


Soil pH

Mean estimates of pH in topsoil (0-15cm depth). Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



Soil pH is not a short list indicator however it is a long list indicator for cultivated crops which is why it has been included in this report.



Asset Quality: Species Composition & Vegetation



The species composition of habitats influence their ability to provide ecosystem services and subsequently impacts the benefits received by society. The composition of plant and animal species present within a habitat reflects the degree of naturalness of that habitat. Habitats with a more natural species assemblage often have greater aesthetic and cultural value, with associated benefits for tourism, education and recreation. Species composition also impacts on provisioning services.

The vegetation characteristics of habitats influence their ability to provide ecosystem services and subsequently impacts the benefits received by society. Vegetation cover, structure and the presence of nectar plants are important factors influencing the provision of ecosystem services.

This suite of maps was not produced by the Local Natural Capital Plan team, instead they are a subset and a cut from the maps produced by a collaboration between NE and CEH. [Link](#). The maps are based on broad habitats and expert opinion (from the UK National Ecosystem Assessment) on their importance for the provision of individual ecosystem services. This simple and transparent approach mapped broad habitats as natural capital.

The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

Natural Capital Indicators	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Biodiversity services
Pollinator flood plants													X					
Naturalness of biological assemblage			X					X						X				

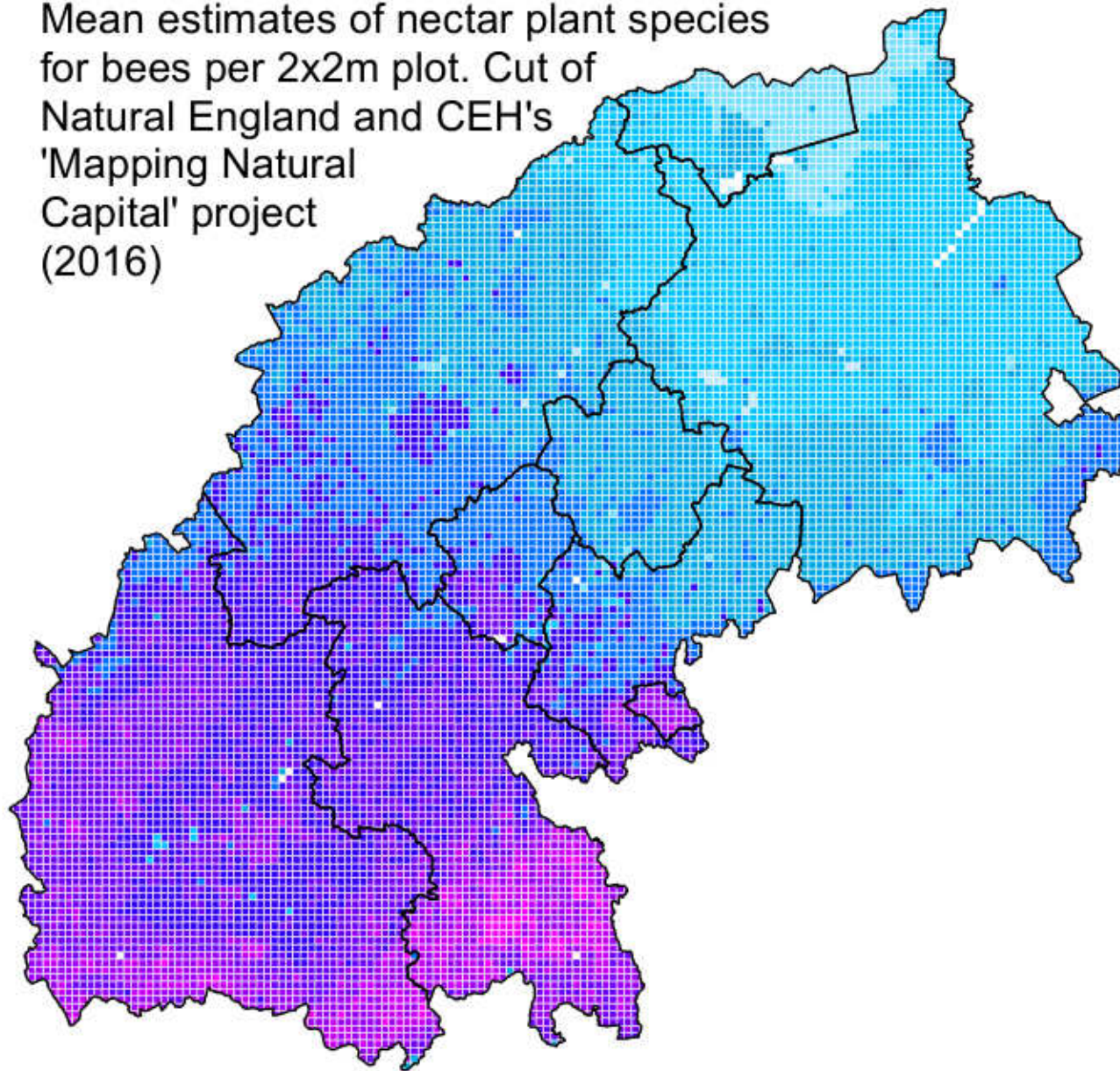
Asset Quality

Soil / Sediment Processes



P Pollinator flood plants

Mean estimates of nectar plant species for bees per 2x2m plot. Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



Grid values: 3.39 – 6.58

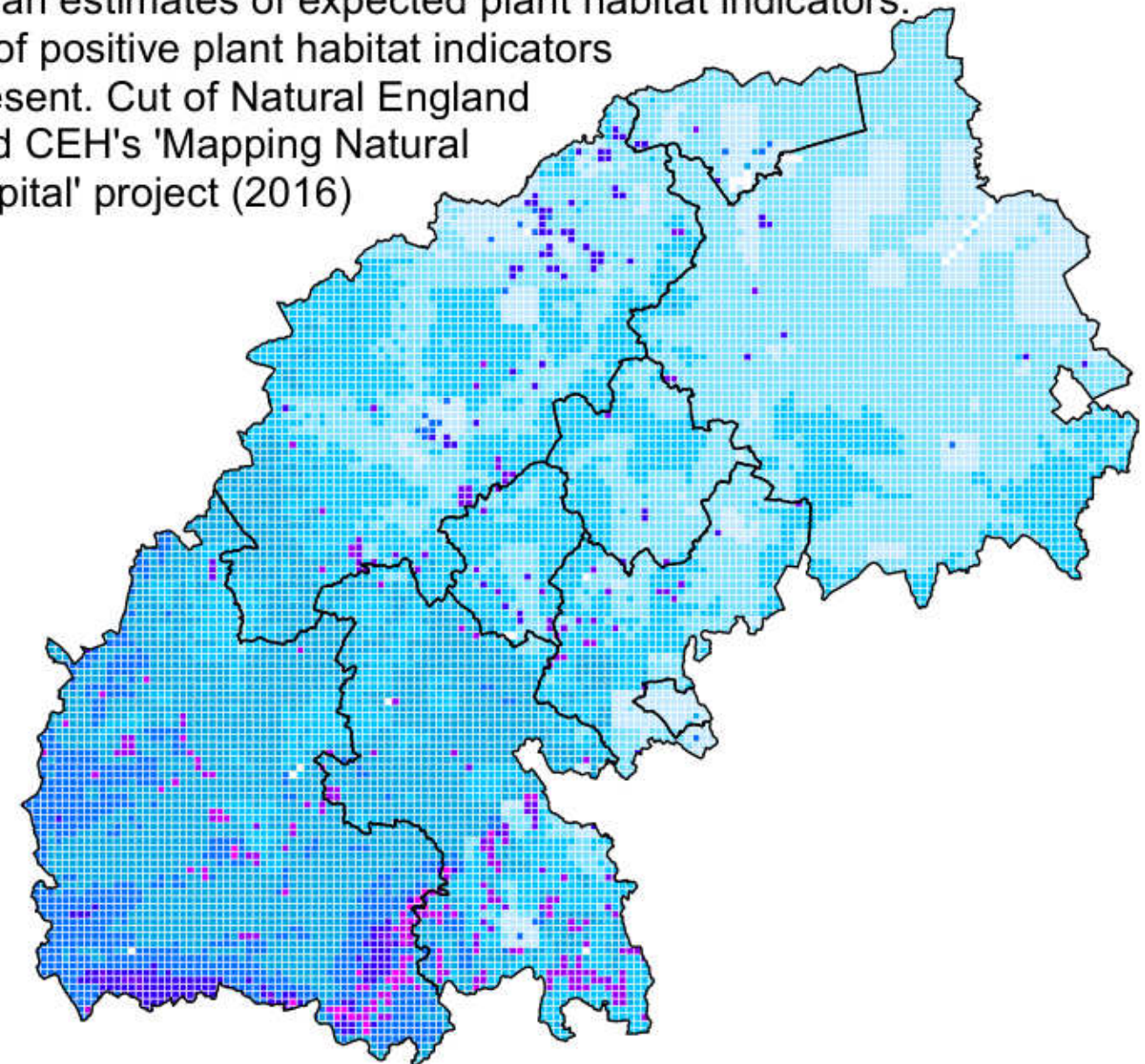
Ecosystems Services Key

The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services

W Naturalness of biological assemblage

Mean estimates of expected plant habitat indicators. % of positive plant habitat indicators present. Cut of Natural England and CEH's 'Mapping Natural Capital' project (2016)



Grid values: 0 – 3.75



Asset Quality: Cultural



There are a number of habitat characteristics that influence the degree of cultural value they provide to society. If accessible, well managed habitats can significantly enhance the mental and physical health of visitors and residents. Habitats and the biodiversity they support have an intrinsic value, beyond the services they deliver to human beings. They can hold an emotional or spiritual value to individuals or communities. The cultural benefits provided by habitats are often difficult to measure as they are less tangible than other benefits provided by nature.

Biodiversity is an important factor influencing the delivery of cultural services. A natural habitat with high species richness has the potential to offer valuable aesthetic, recreational or educational services. The presence of rare or flagship species (such as wetland bitterns and the grey seals of England's coasts) is also important and may generate revenue for the local economy through tourism. Habitats often contain designated heritage assets and boundary features that have remained in place for centuries and accrue tremendous historical value. Public Rights of Way facilitate the delivery of cultural services in habitats that would otherwise be inaccessible to most

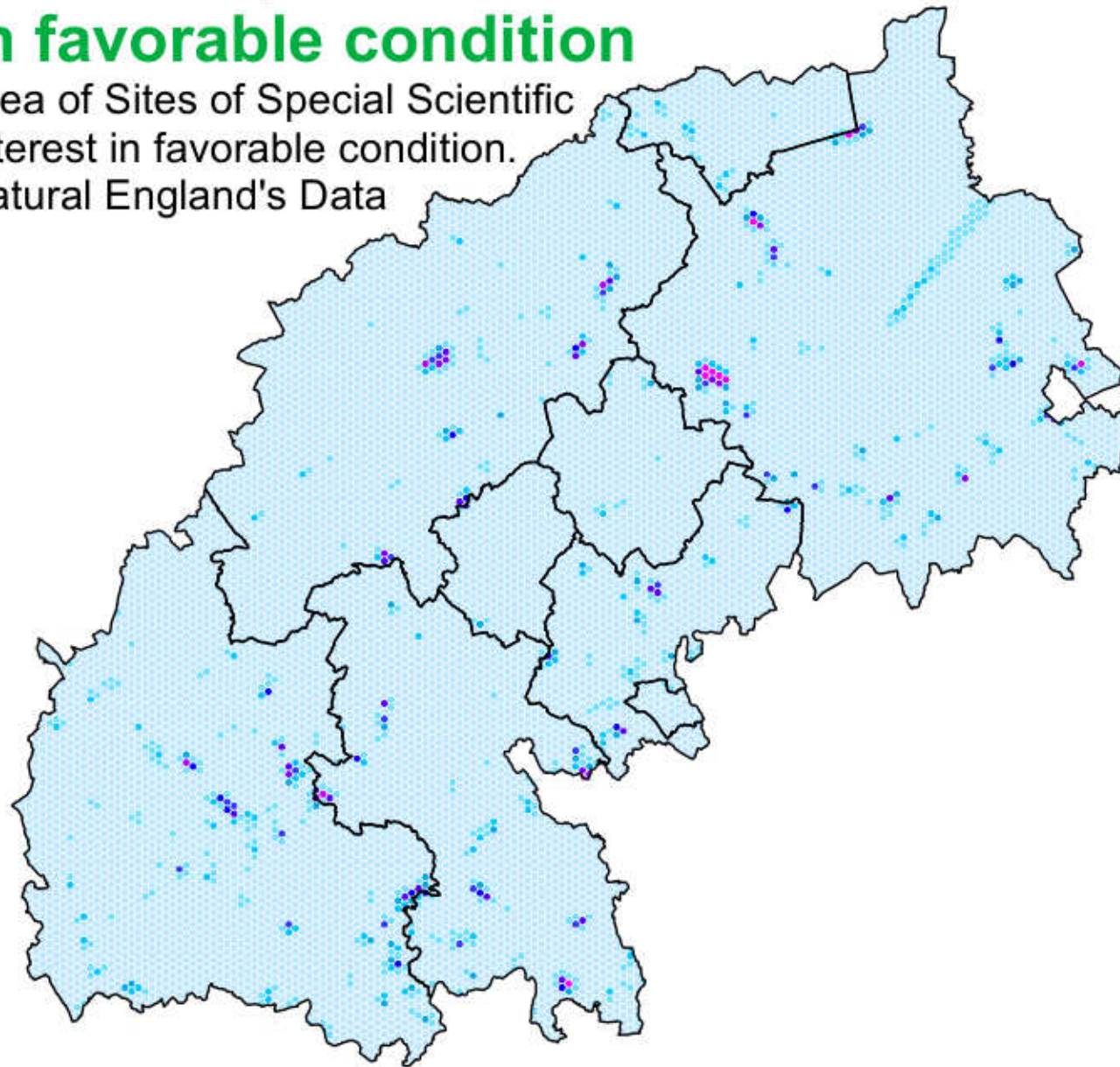
The Natural England Natural Capital Indicator's report only produced logic chains for key ecosystem services from each broad habitat type, therefore the matrix below shows the short-list indicators for the key ecosystem services.

Natural Capital Indicators	Ecosystems Services																	
	Materials from plants, animals & algae	Plant-based energy	Wild animals, plants, algae & outputs	Aquaculture	Cultivated crops	Water supply	Reared animals & outputs	Water quality	Air quality	Noise regulation	Mass stabilisation	Flood protection	Pollination & seed dispersal	Maintenance of nursery populations & habitats	Pest & disease control	Climate regulation	Cultural services	Geodiversity services
Sites of Special Scientific Interest																	X	X
Tranquillity																	X	
Public Rights of way																	X	
Designated historic environments																	X	

Asset Quality - Cultural

Sites of Special Scientific Interest in favorable condition

Area of Sites of Special Scientific Interest in favorable condition.
Natural England's Data



Hexagon values: 0 – 1 km sq

Ecosystems Services Key

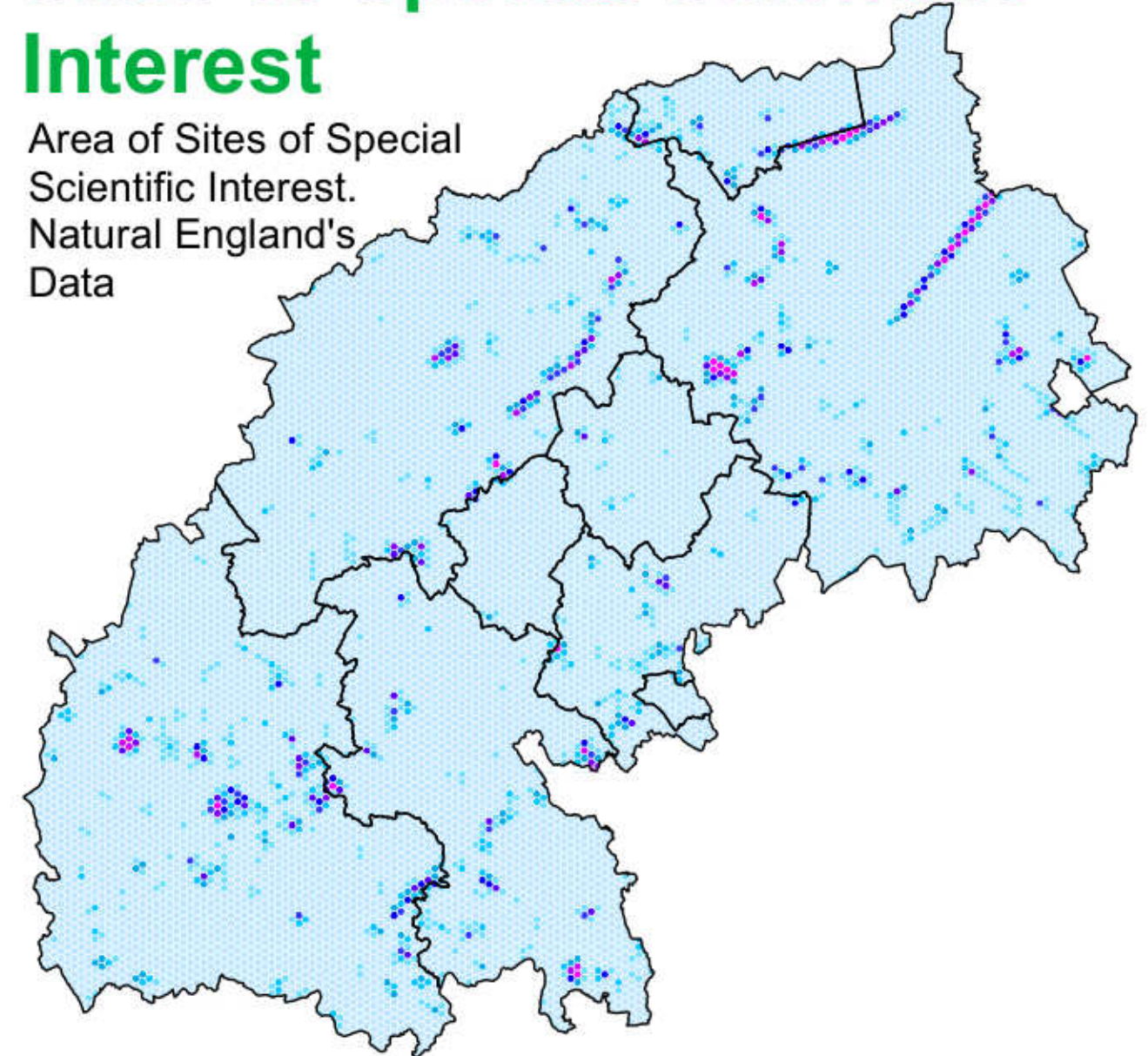
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
 Materials from plants, animals and algae	 Water quality	 Cultural services
 Wild animals, plants, algae and outputs	 Air quality	 Geodiversity services
 Plant-based energy	 Noise regulation	
 Aquaculture	 Mass stabilisation	
 Cultivated crops	 Flood protection	
 Water supply	 Pollination and seed dispersal	
 Reared animals and outputs	 Maintenance of nursery populations and habitats	
	 Pest and disease control	
	 Climate regulation	



Sites of Special Scientific Interest

Area of Sites of Special Scientific Interest.
Natural England's Data



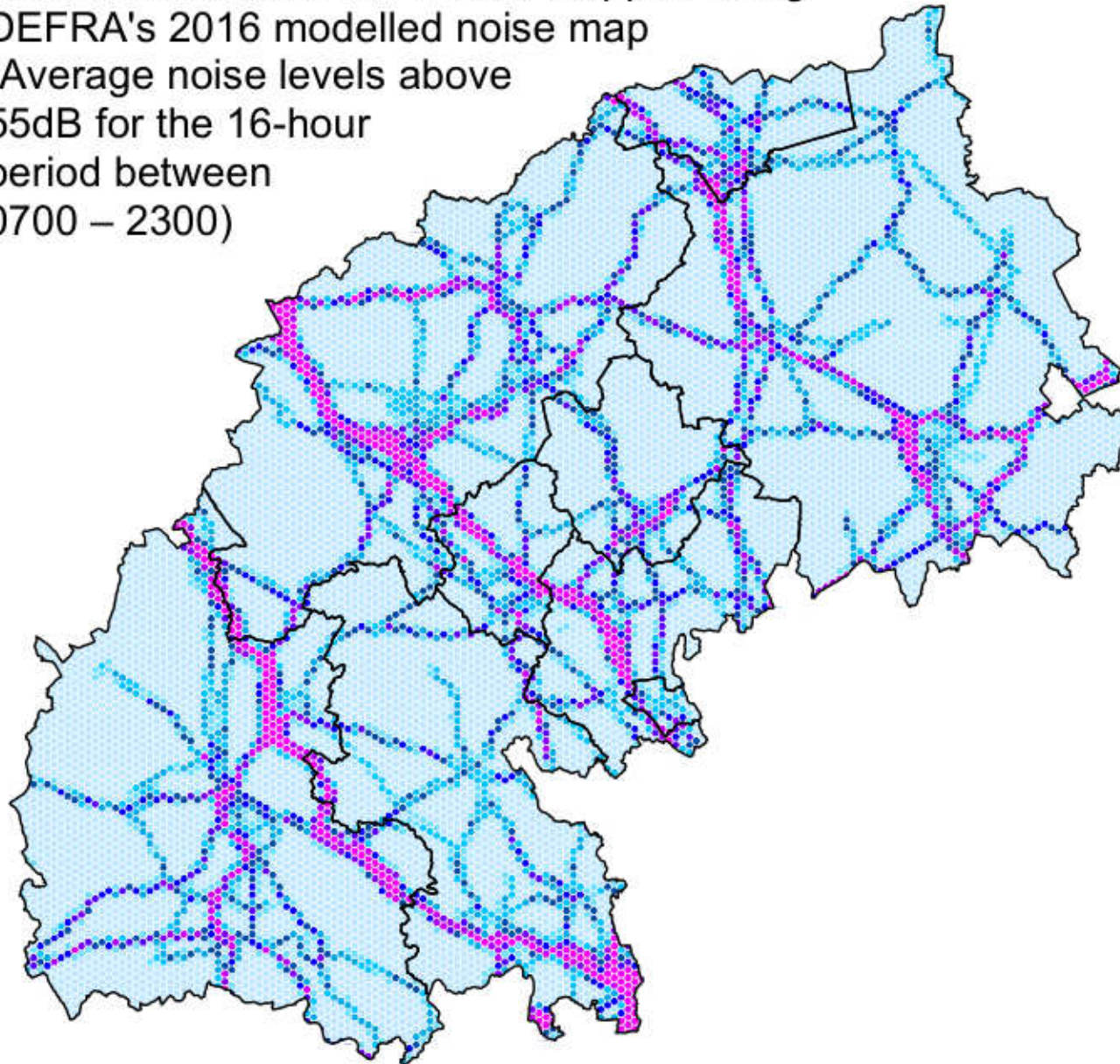
Hexagon values: 0 – 1 km sq

SSSI's are not considered indicators under Natural England's Natural Capital Indicators project unless they are in favourable condition.
This dataset has been included to provide a comparison.

Asset Quality - Cultural

Tranquility

Area of noise from rail & road mapped using DEFRA's 2016 modelled noise map (Average noise levels above 55dB for the 16-hour period between 0700 – 2300)

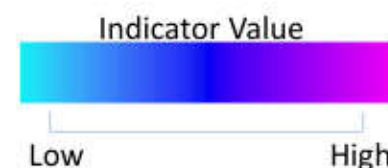


Hexagon values: 0 – 0 km sq

Ecosystems Services Key

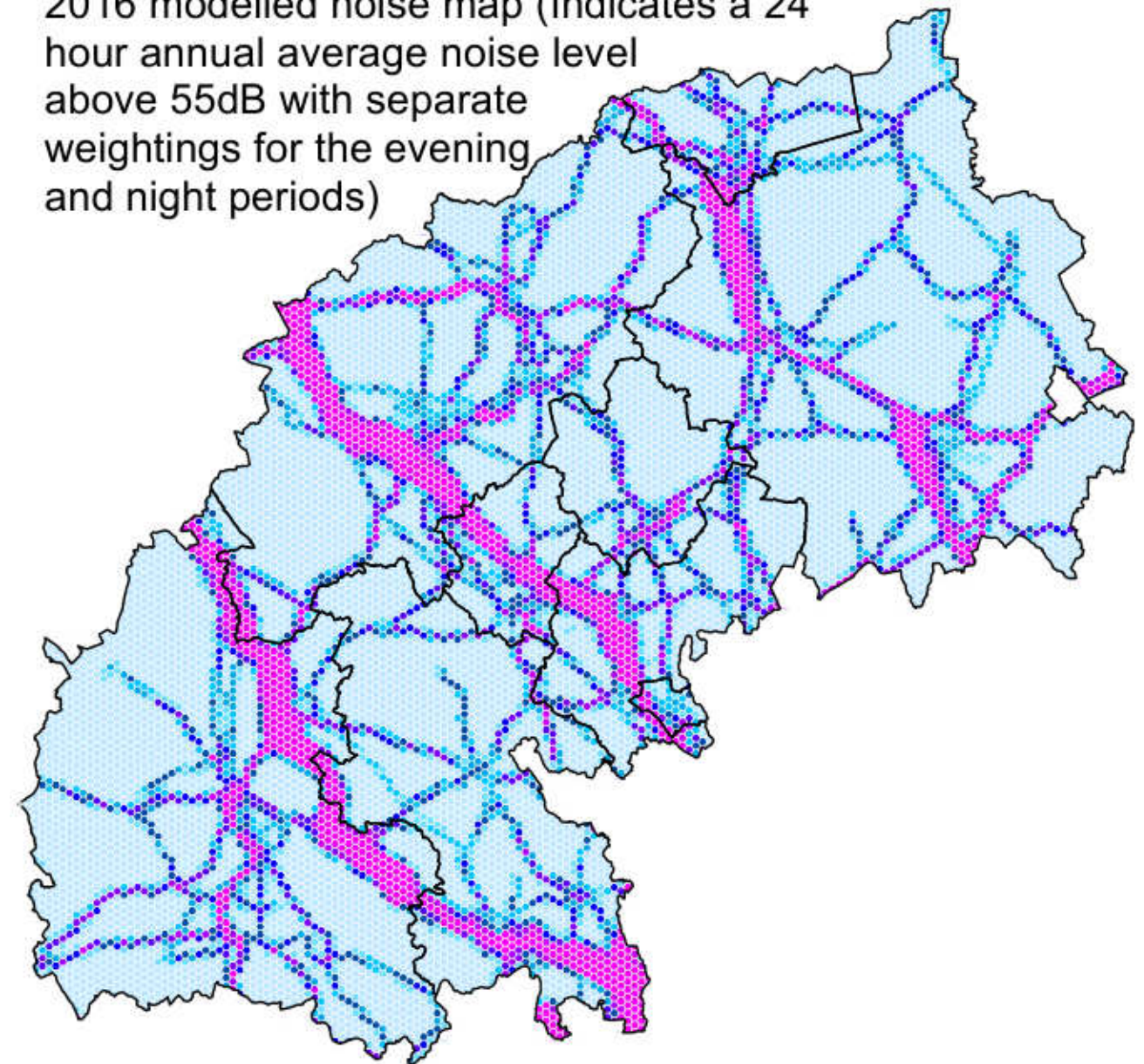
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



Tranquility

Area of noise from rail & road mapped using DEFRA's 2016 modelled noise map (Indicates a 24 hour annual average noise level above 55dB with separate weightings for the evening and night periods)

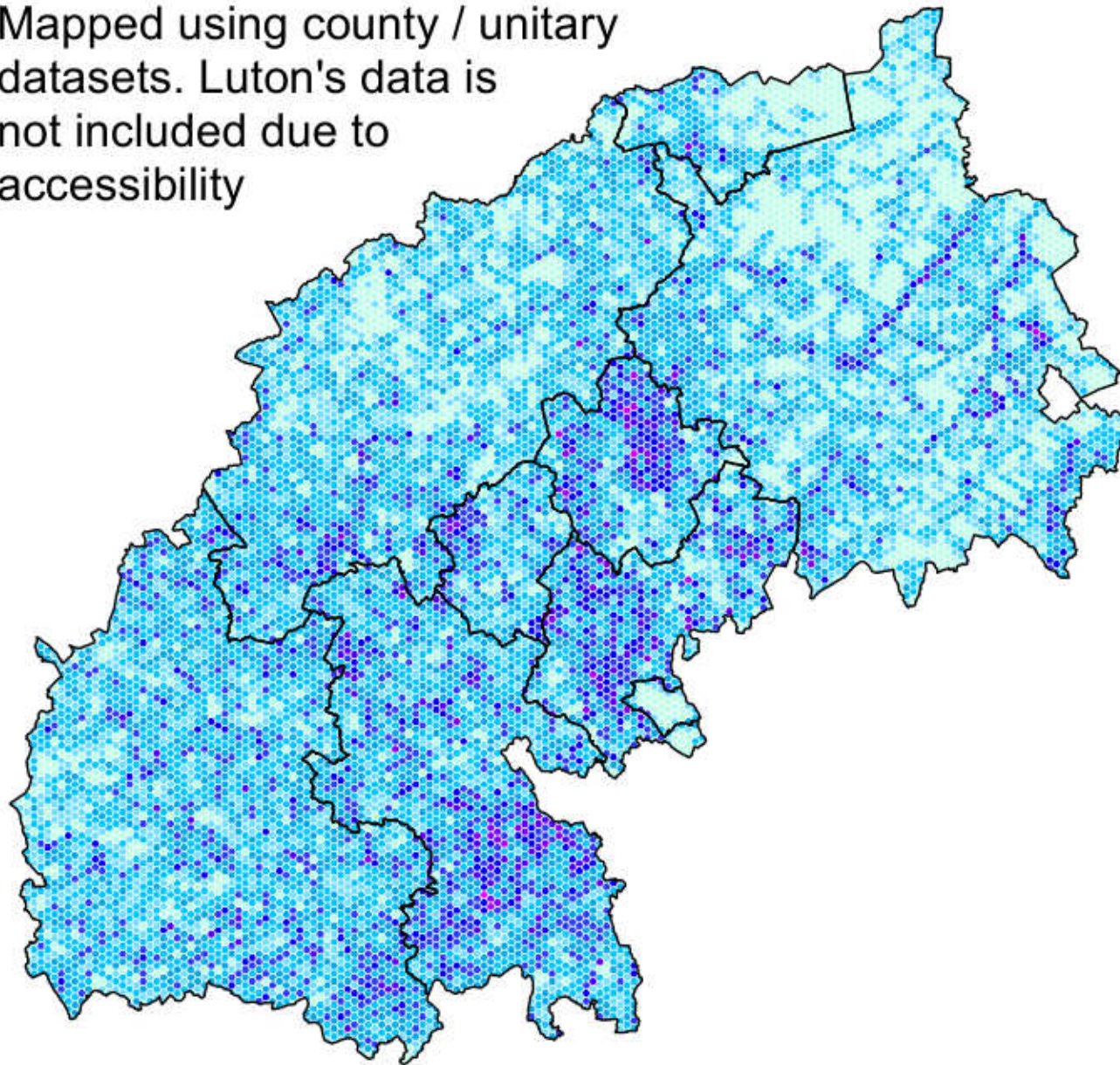


Hexagon values: 0 – 1 km sq

Asset Quality - Cultural

Public Rights of Way

Lengths of Public Rights of Way per 1km sq hexagon. Mapped using county / unitary datasets. Luton's data is not included due to accessibility



Hexagon values: 0 – 9.52 km

Ecosystems Services Key

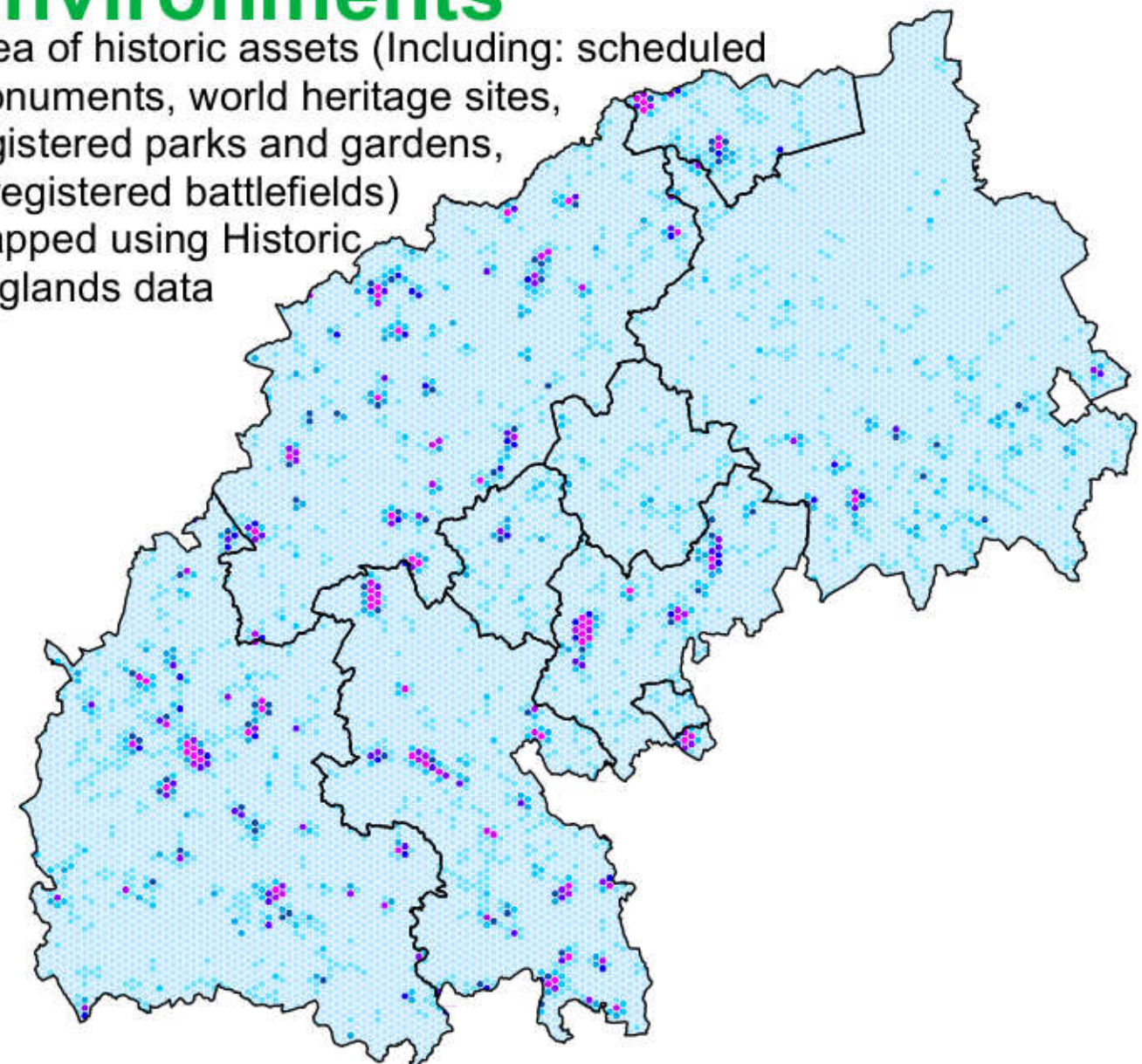
The coloured circles denote the key ecosystem services that are associated with each indicator

Provisioning	Regulating	Cultural
- Materials from plants, animals and algae - Wild animals, plants, algae and outputs - Plant-based energy - Aquaculture - Cultivated crops - Water supply - Reared animals and outputs	- Water quality - Air quality - Noise regulation - Mass stabilisation - Flood protection - Pollination and seed dispersal - Maintenance of nursery populations and habitats - Pest and disease control - Climate regulation	Cultural services



Designated Historic Environments

Area of historic assets (Including: scheduled monuments, world heritage sites, registered parks and gardens, & registered battlefields) mapped using Historic Englands data



Hexagon values: 0 – 1 km sq

References



Open Mosaic Habitat (Draft),& Priority Habitat Inventory	© Natural England copyright
Strategic Noise Mapping	Contains Defra information © Defra
Open Green Space, VectorMap District & Strategi	Contains Ordnance Survey data © Crown copyright and database right [2019]
Risk of Flooding from Rivers and Sea	Contains Environment Agency information © Environment Agency and/or database right
Main River & Artificial Canals	Contains Environment Agency information © Environment Agency and/or database right
Surface Water Resource Availability and Abstraction Reliability Cycle 2	Contains Environment Agency information © Environment Agency and/or database right
WFD Surface Water & Groundwater Status (Cycle 2)	Contains Environment Agency information © Environment Agency and/or database right
National Forest Inventory	Crown Copyright, courtesy Forestry Commission (2019), licensed under the Open Government Licence
Scheduled Monuments, World Heritage Sites, Registered Battlefields & Registered Parks and Gardens	© Historic England [2019]. Contains Ordnance Survey data © Crown copyright and database right [2019]
SSSI Units & Ancient Woodlands	© Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right [2019]
Corine Landcover	© Landcover data was produced by a programme coordination by the European Environment Agency (EEA) with funding from the European Union. All rights Reserved.
Built-Up Areas	Contains National Statistics data © Crown copyright and database right [2019]. Contains OS data © Crown copyright and database right [2019]
CEH Land Cover Map 2015	Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O'Neil, A.W.; Wood, C.M. (2017) Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre. https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7 All rights reserved.

References



Natural Capital Indicators: for defining and measuring change in natural capital	LUSARDI, J., RICE, P. WATERS, R.D. AND CRAVEN J. (2018). Natural Capital Indicators: for defining and measuring change in natural capital. Natural England Research Report, Number 076. All rights reserved.
Natural Capital Atlases	Natural England (2019). National Natural Capital Atlas. Natural England Commissioned Report by Westcountry Rivers Ltd. All rights reserved.
NE CEH NC Maps: Soil carbon	Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). Model estimates of topsoil carbon [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/9e4451f8-23d3-40dc-9302-73e30ad3dd76
NE CEH NC Maps: Soil nitrogen	Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). Model estimates of topsoil nutrients [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/7055965b-7fe5-442b-902d-63193cbe001c
NE CEH NC Maps: Soil pH	Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). Model estimates of topsoil pH and bulk density [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/5dd624a9-55c9-4cc0-b366-d335991073c7
NE CEH NC Maps: Soil invertebrates	Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). Model estimates of topsoil invertebrates [Countryside Survey]. NERC Environmental Information Data Centre. http://doi.org/10.5285/f19de821-a436-4b28-95f6-b7287ef0bf15
NE CEH NC Maps: Nectar plant diversity for bees	Maskell, L.; Henrys, P.; Norton, L.; Smart, S. (2016). Bee nectar plant diversity of Great Britain. NERC Environmental Information Data Centre. http://doi.org/10.5285/623a38dd-66e8-42e2-b49f-65a15d63beb5
NE CEH NC Maps: Plant indicators for habitats in good condition	Maskell, L.; Henrys, P.; Norton, L.; Smart, S. (2016). Model estimates of expected diversity of positive plant habitat condition indicators. NERC Environmental Information Data Centre. http://doi.org/10.5285/cc5ae9b1-43a0-475e-9157-a9b7fccb24e7
Public rights of way (Buckinghamshire; Cambridgeshire; Central Bedfordshire Northamptonshire; Oxfordshire; Milton Keynes and City of Peterborough)	Contains public sector information licensed under the Open Government License v3.0. contains Ordnance Survey data © Crown copyright and database right [2019]

Released under Open Government Licence v3.0. Note that some third party data is not covered by this licence, particularly where indicated "all rights reserved"
<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>