NATURAL CAPITAL ATLAS: MAPPING INDICATORS

Natural Capital Explained

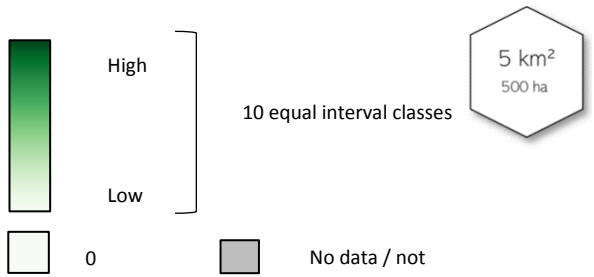
Definition: 'the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions' (Natural Capital Committee, 2017). Natural capital shows the links between ecosystem assets, services, benefits and value to people. For example, an area of woodland may reduce air pollution and therefore improve air quality in the surrounding area which results in improved health, which is of value to local communities.

In 2018, Natural England published 'Natural Capital Indicators: for defining and measuring change in natural capital'. This report identified key properties of the natural environment vital for the long-term sustainability of benefits, which can act as indicators of change.

Report Structure

Map Key:

This atlas is a cut of the National Atlas, using the same nationally available indicators and datasets, however, displaying the data at a finer resolution of 5km^2



Methodology

- Hexagonal units of 5 km^2 were used and a grid was created.
- Datasets were processed and indicator values were calculated and assigned to each spatial unit (e.g., area of habitat per hexagon).
- The values were symbolised for the whole of the country and indicator maps were created for each county or local area (e.g., the Cotswolds).
- Some maps may have very dark or light shades. This indicates the values for that specific indicator are either very high or very low in comparison to the rest of the country.
- Each individual map compares each cell to a national average.
- White hexagons represent 0 and grey values have a 'null' value for the given indicator, meaning that there are gaps in the dataset or that it is not possible for a hexagon to have a value for that indicator.

Indicator Summary – Quantity

Indicator Summary – Quality

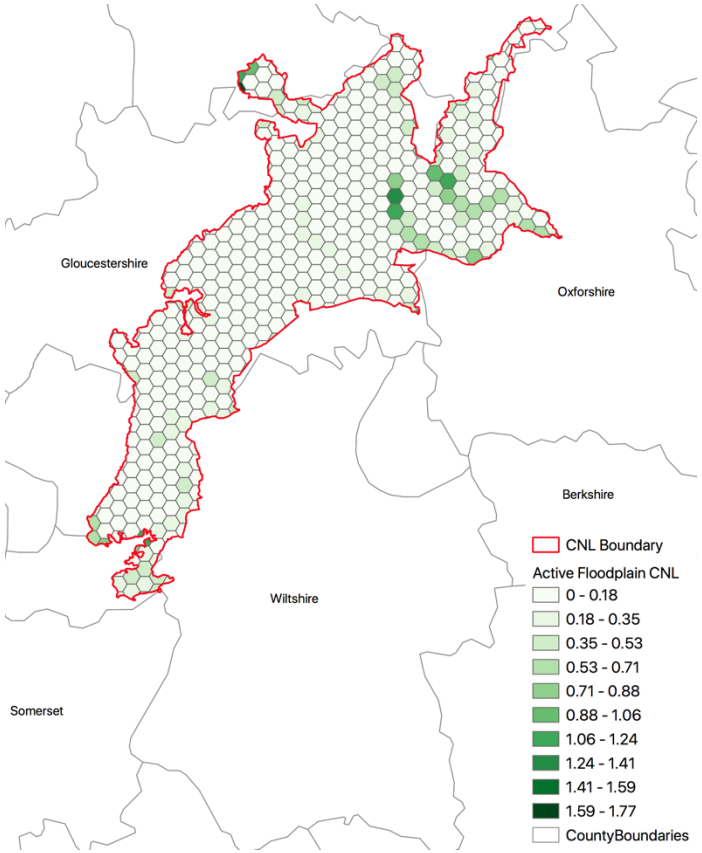
Indicator Summary – Others

ASSET QUANTITY: Freshwater

Freshwater habitats include all waterbodies and wetlands, such as rivers, lakes, ponds, fens, marshes and bogs. Despite freshwater only occupying 0.7% of land in England (CEH LCM2015), freshwater habitats are vital for many plants and animal species.

Active Flood Plain (ID: 1)

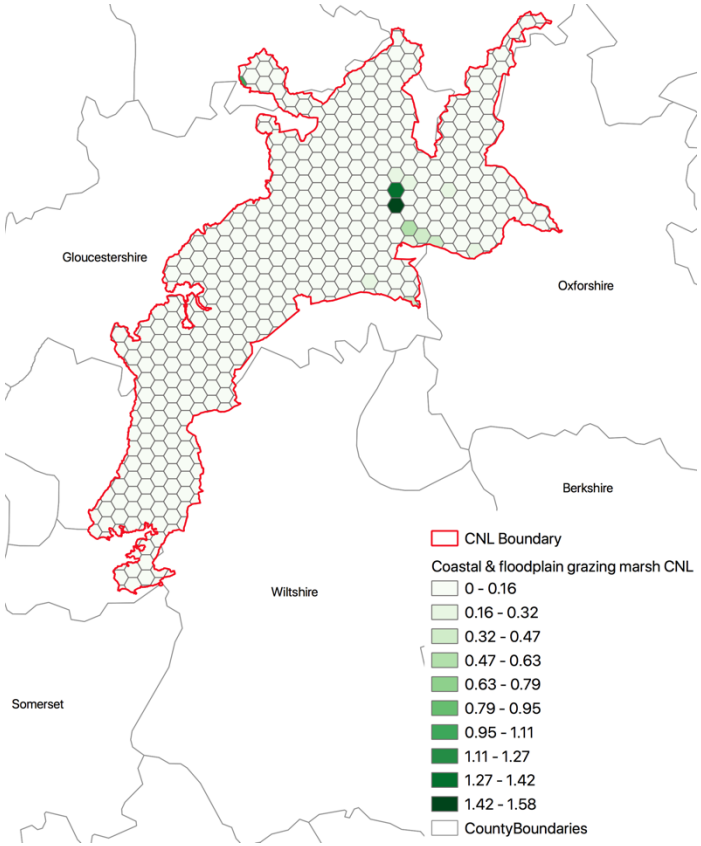
This map shows areas of high or medium risk of flooding.



Area (km^2)

Coastal and Floodplain Grazing Marsh (ID:2)

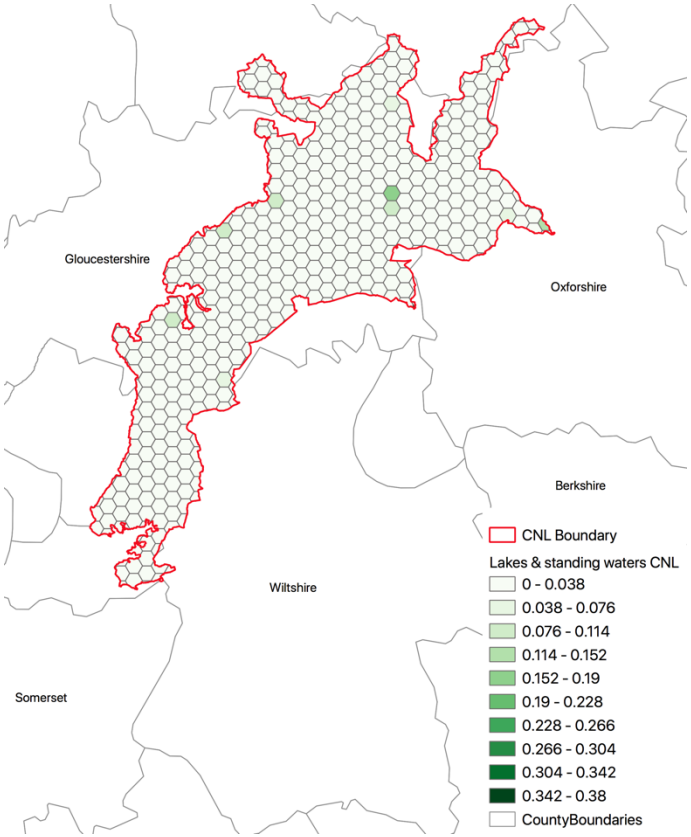
Area of coastal floodplain and grazing marsh mapped using Natural England's priority habitat inventory.



Area (km^2)

Lakes and Standing Waters (ID:3)

Area of lakes and reservoirs mapped using the Centre for Ecology and Hydrology's UK Lakes Portal dataset.

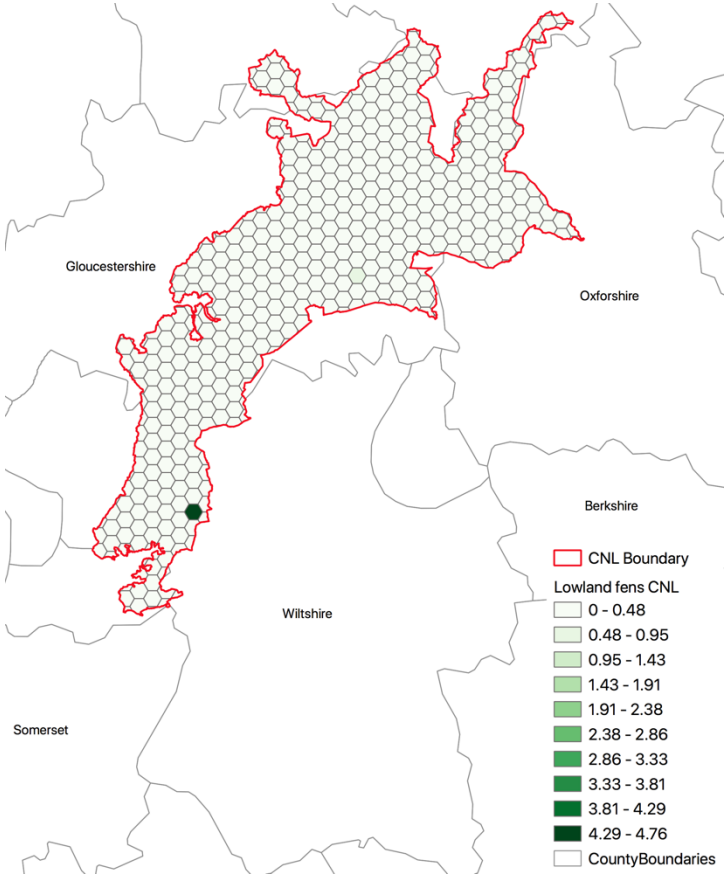


Area (km^2)

ASSET QUANTITY: Freshwater

Lowland Fens (ID: 4)

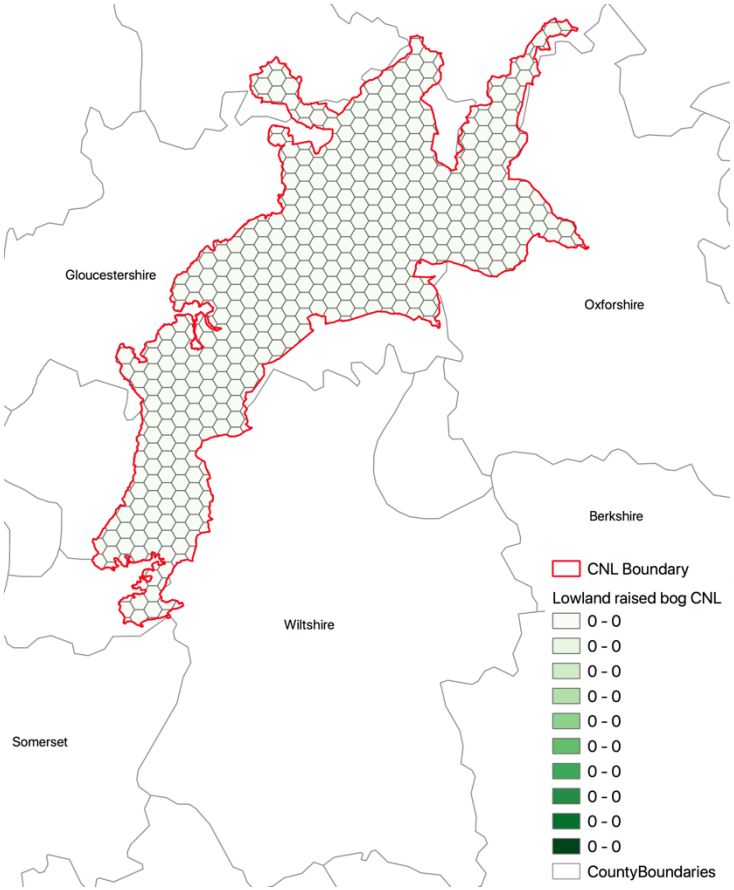
Area of lowland fens mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Lowland Raised Bog (ID: 5)

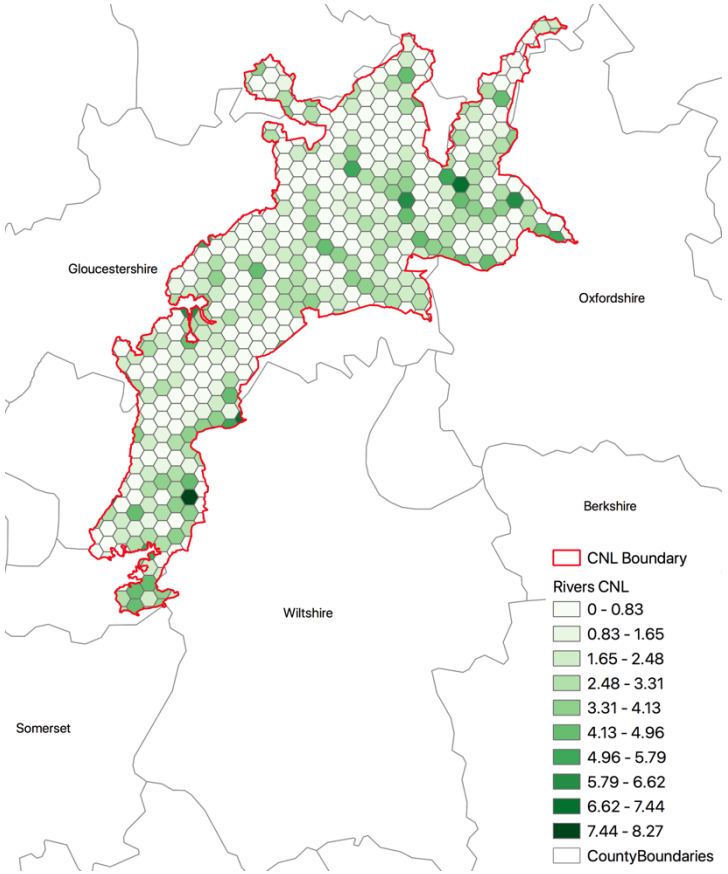
Area of lowland raised bog mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Rivers (ID: 6)

Length of rivers mapped using EA's Water Framework Directive (WFD) river waterbodies dataset.

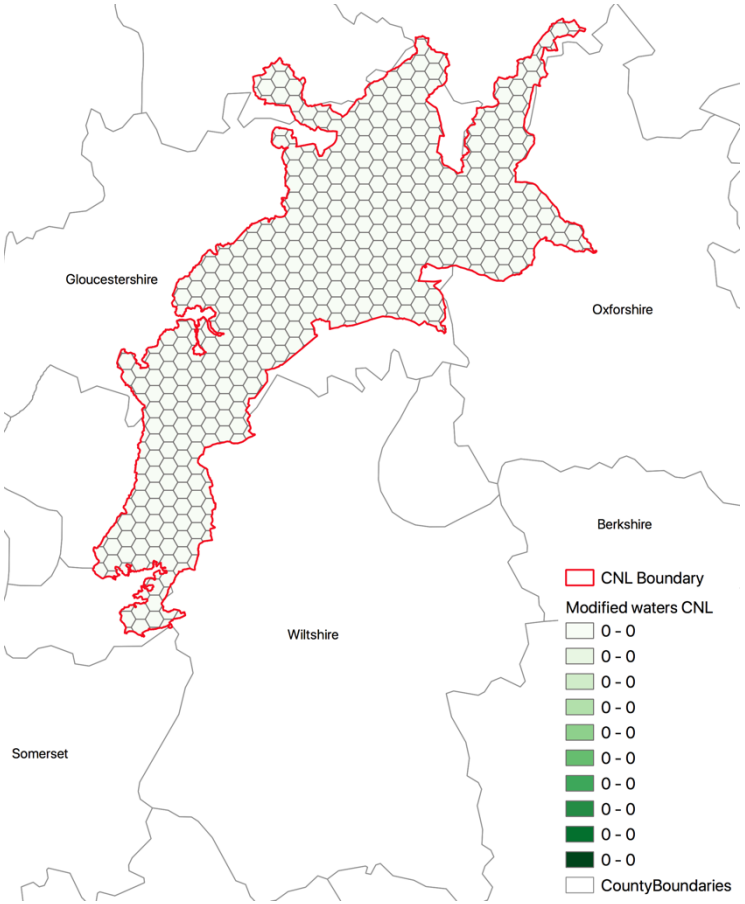


Area (km^2)

ASSET QUANTITY: Freshwater

Modified Waters (Reservoirs) (ID: 7)

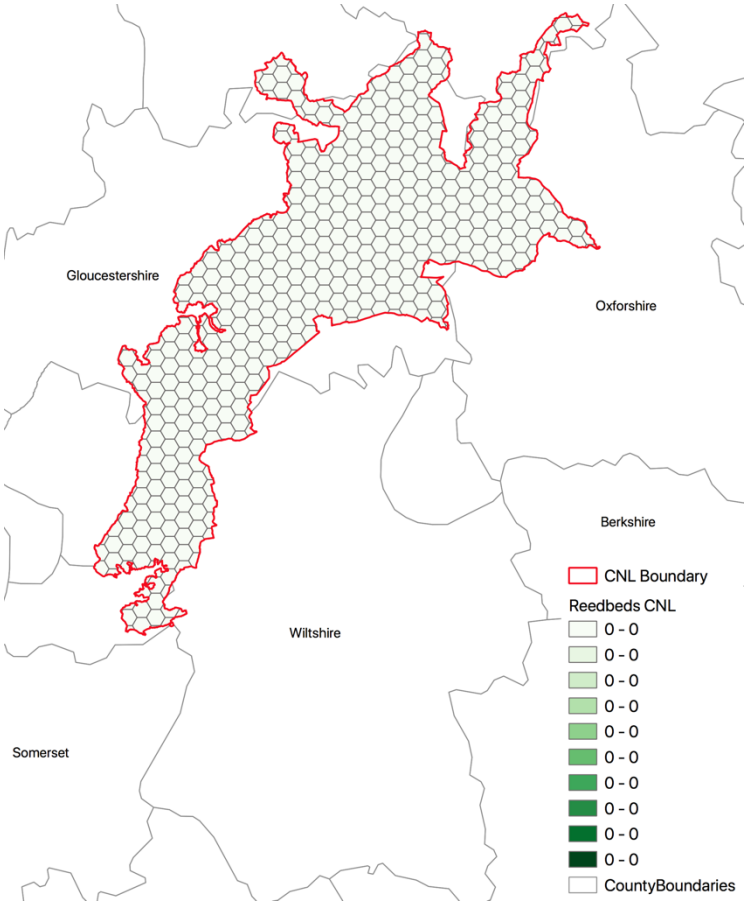
Area of reservoirs mapped by intersecting CEH's inventory of UK reservoirs with surface water polygons.



Area (km^2)

Reedbeds (ID: 8)

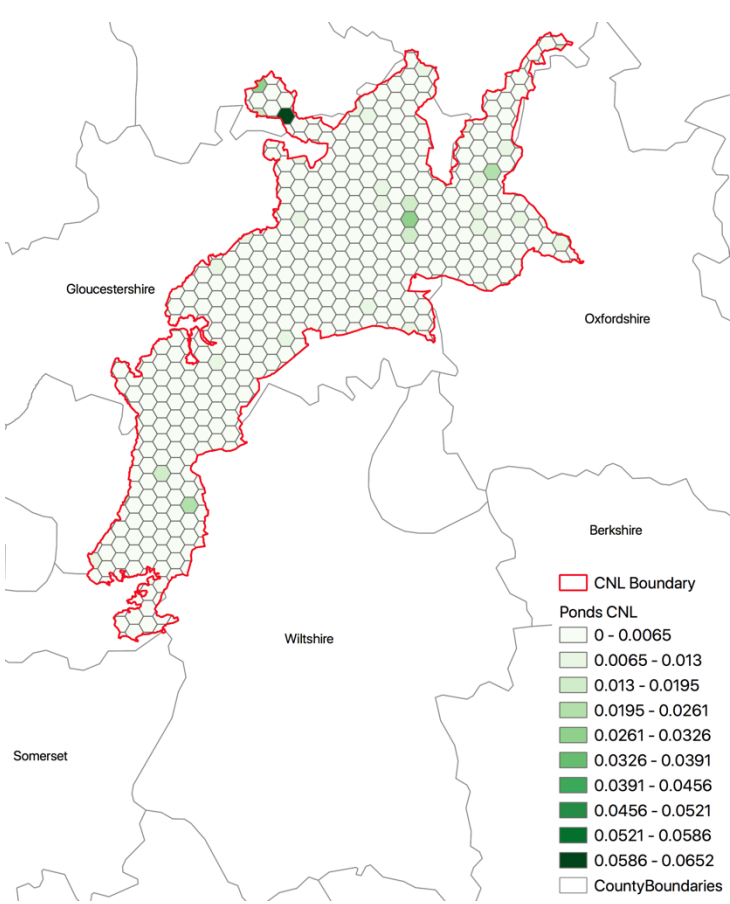
Area of reedbed habitat mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Ponds (ID: 9)

Area of ponds mapped by selecting surface waterbodies that do not intersect rivers, are smaller than 2ha in size and are non-linear.

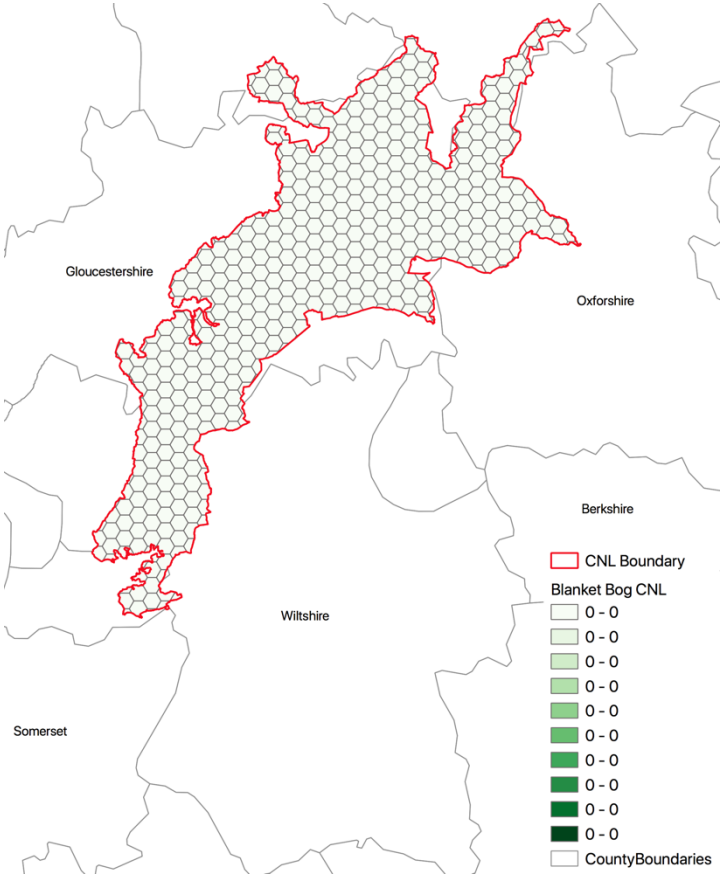


Area (km^2)

ASSET QUANTITY: Freshwater

Blanket Bog (ID: 10)

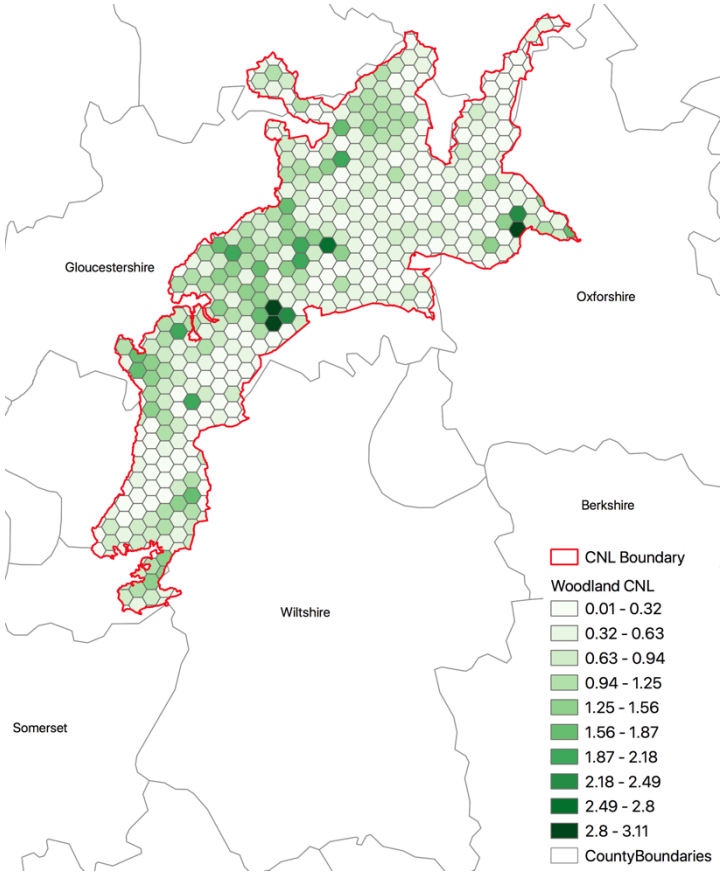
Area of blanket bog mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Woodland (ID: 11)

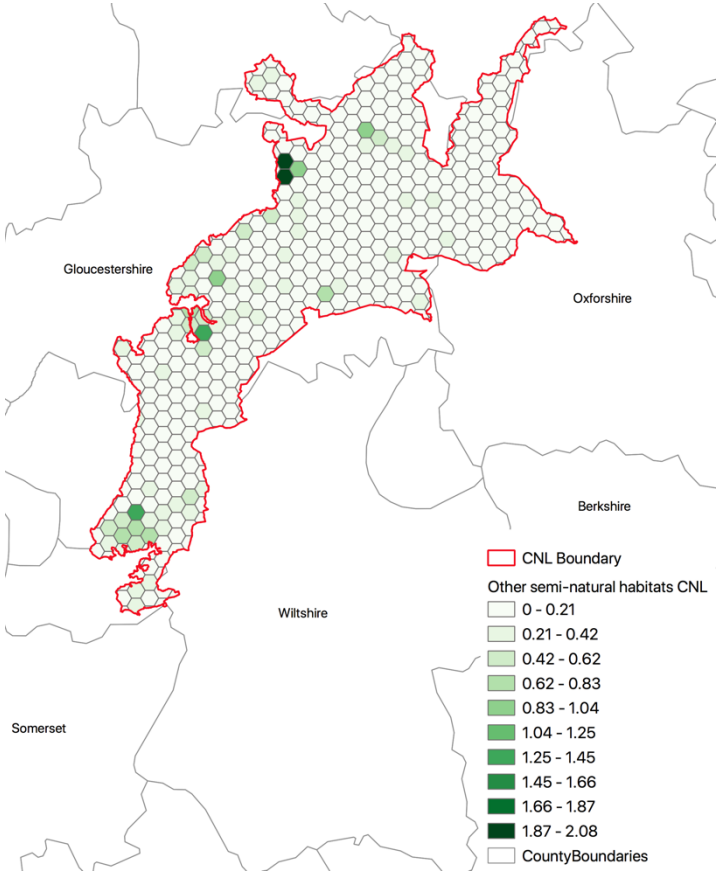
Area of woodland mapped using Forestry Commission (FC)'s National Forest Inventory.



Area (km^2)

Other Semi-Natural Habitats (ID: 12)

Area of other semi-natural habitat mapped using Natural England's Priority Habitat Inventory.



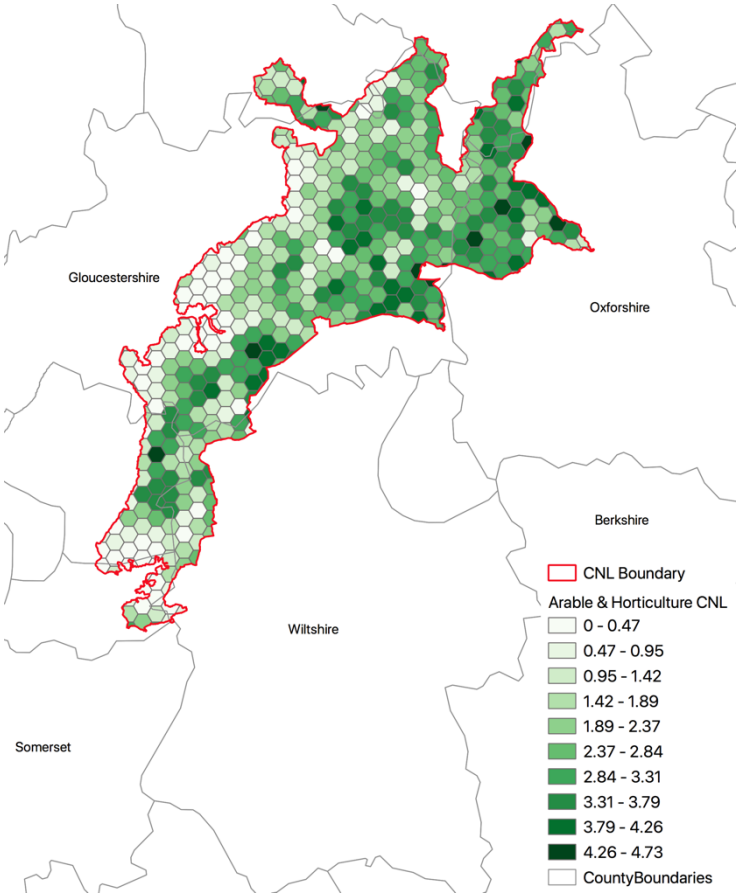
Area (km^2)

ASSET QUANTITY: Farmland

Roughly 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. This section focuses on enclosed farmland, for example, grazing pastures, arable land and orchards.

Arable and Horticulture (ID: 13)

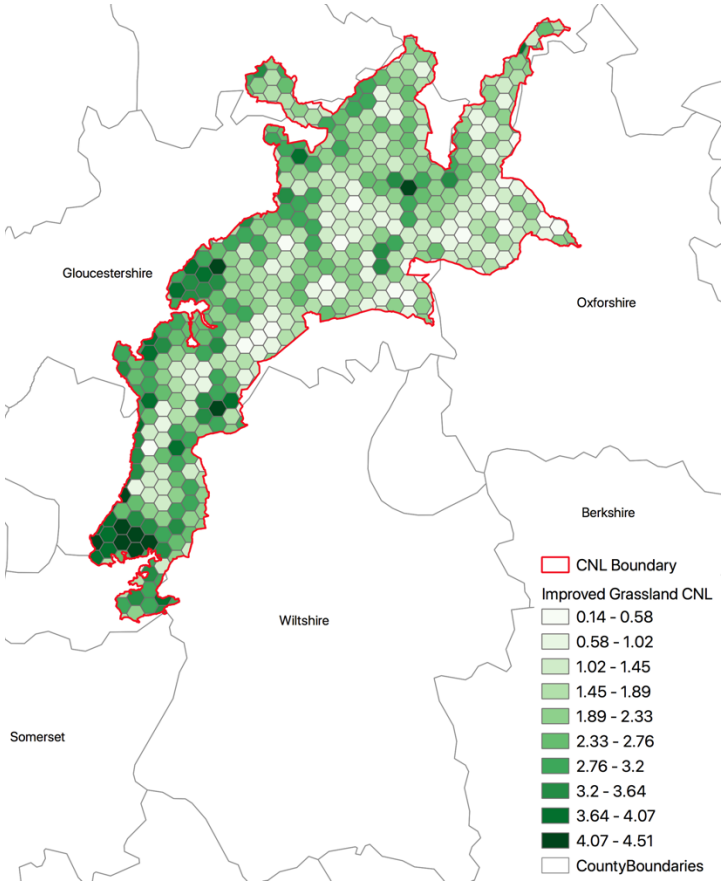
The area of farmland used for arable and horticulture (combined) has been mapped using CEH's Land Cover Map 2015 (LCM2015).



Area (km^2)

Improved Grassland (ID: 14)

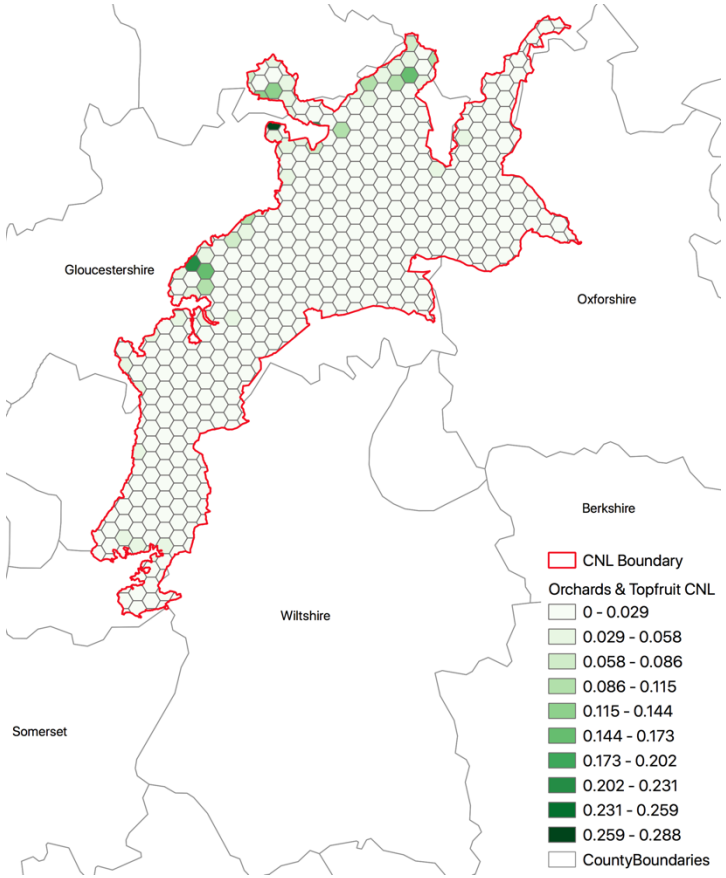
Area of improved grassland mapped using CEH's LCM2015.



Area (km^2)

Orchards and Top fruit (ID: 15)

Areas of orchards and top fruit mapped using Natural England's Priority Habitat Inventory.



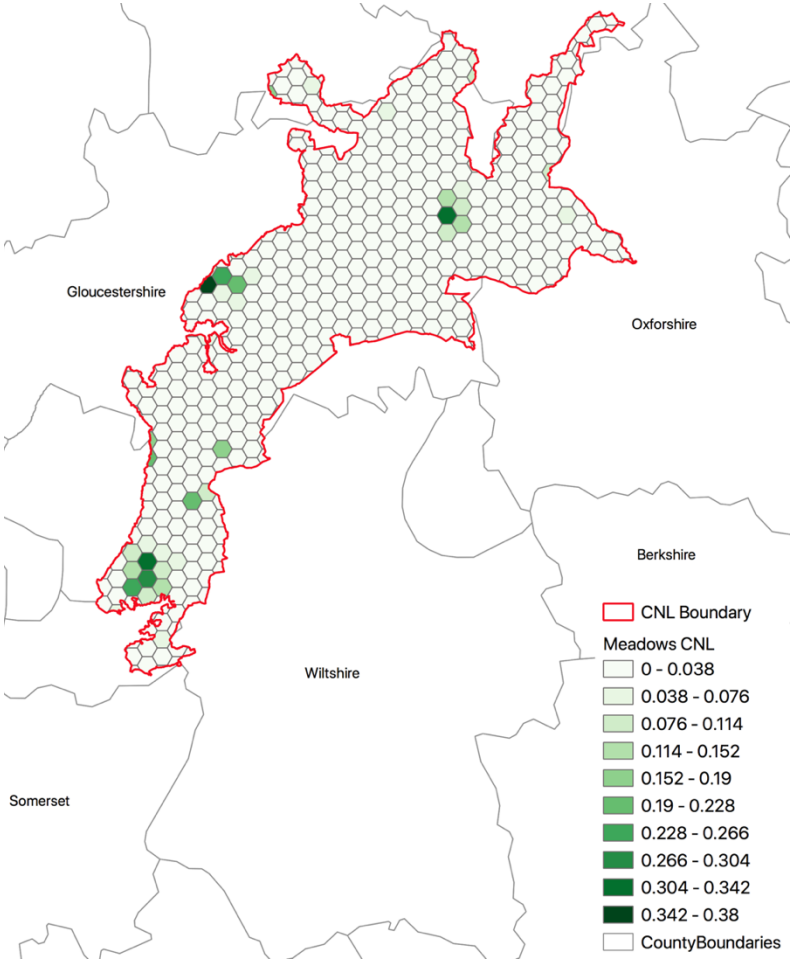
Area (km^2)

ASSET QUANTITY: Grassland

Grasslands make up roughly 40% of England's land cover (CEH LCM2015), ranging from rough moorland grazing to urban parks and gardens. This chapter focuses on semi-natural grasslands which represents an important habitat for many plants and animals.

Meadows (ID: 16)

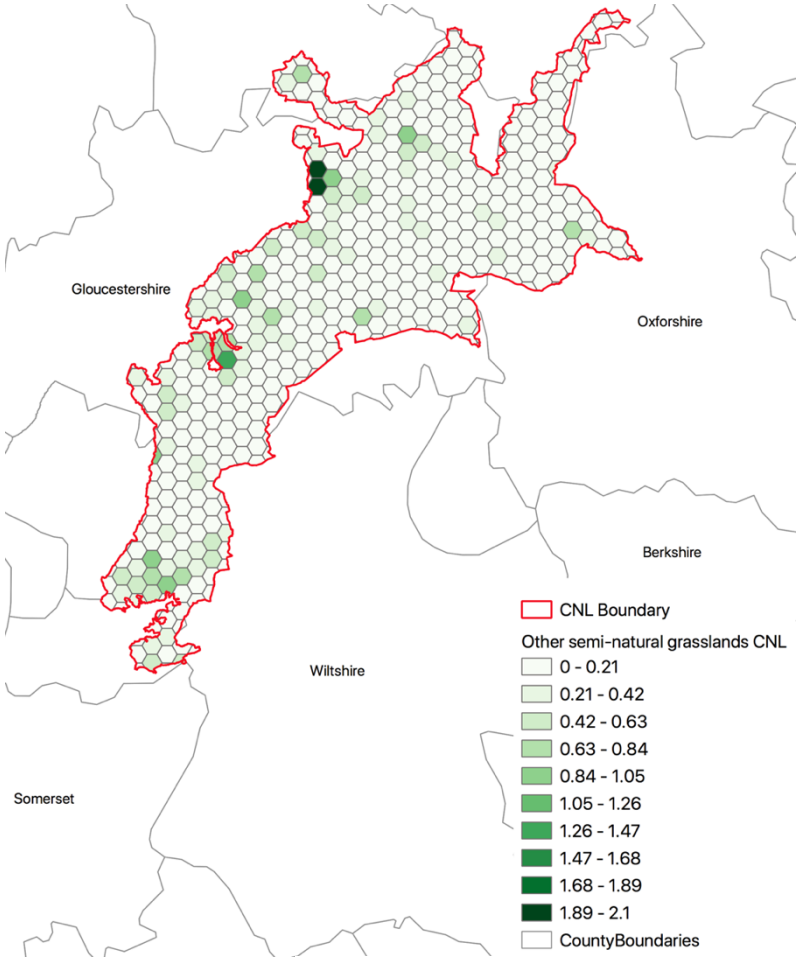
Area of upland and lowland meadow mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Other Semi-Natural Grassland (ID: 17)

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



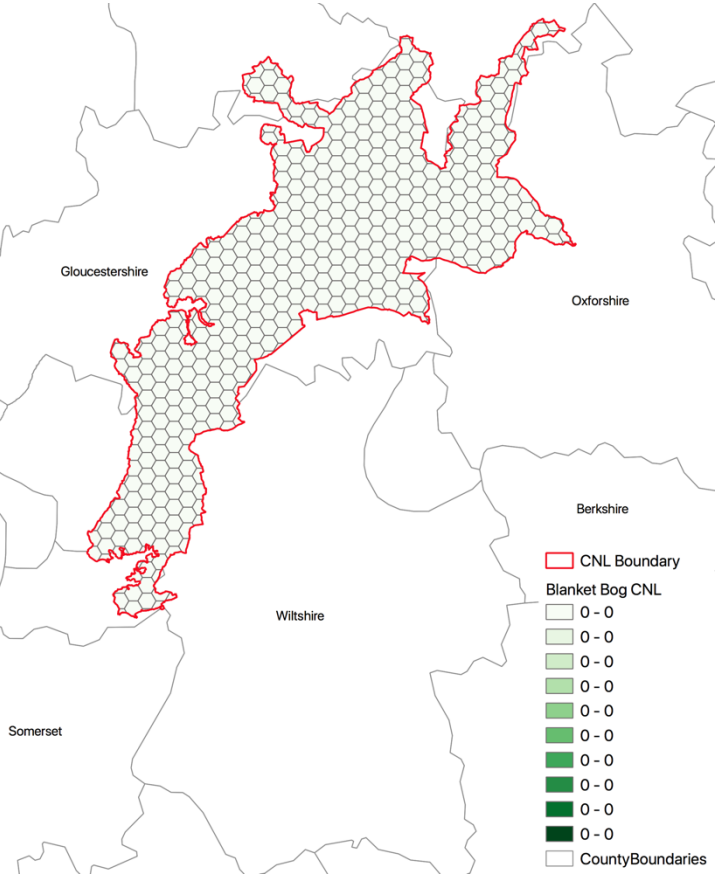
Area (km^2)

ASSET QUANTITY: Mountains, Moors & Heaths

Mountains, moors and heaths cover 18% of the UK's land area (CEH LCM2015). They are the source of 70% of the UK's drinking water, hold roughly 40% of UK soil carbon (UK NEA, 2011) and host numerous rare plants and animals.

Blanket Bog (ID: 18)

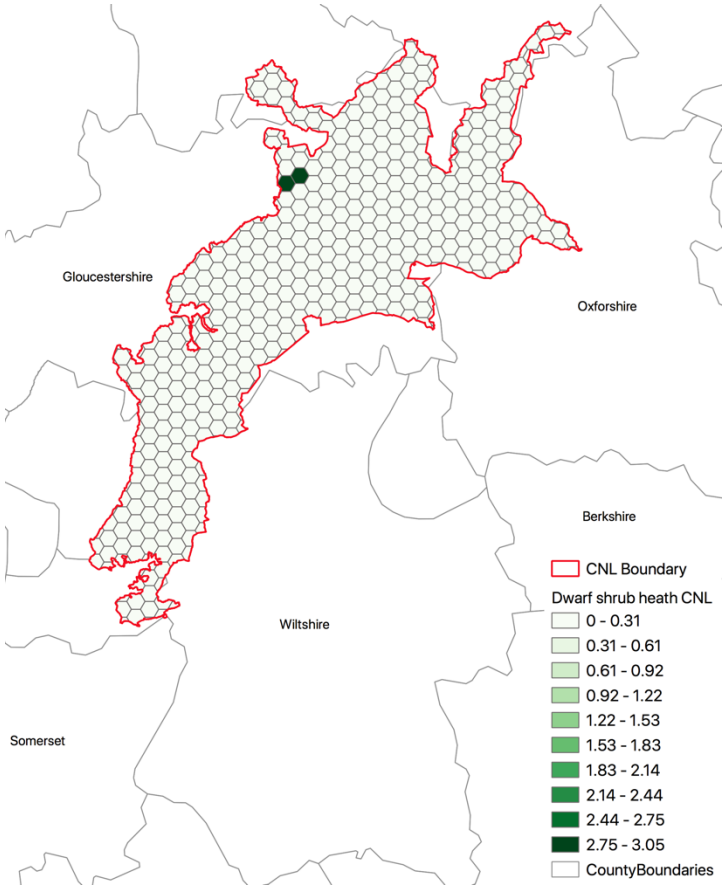
Area of blanket bog mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Dwarf Shrub Heath (ID: 19)

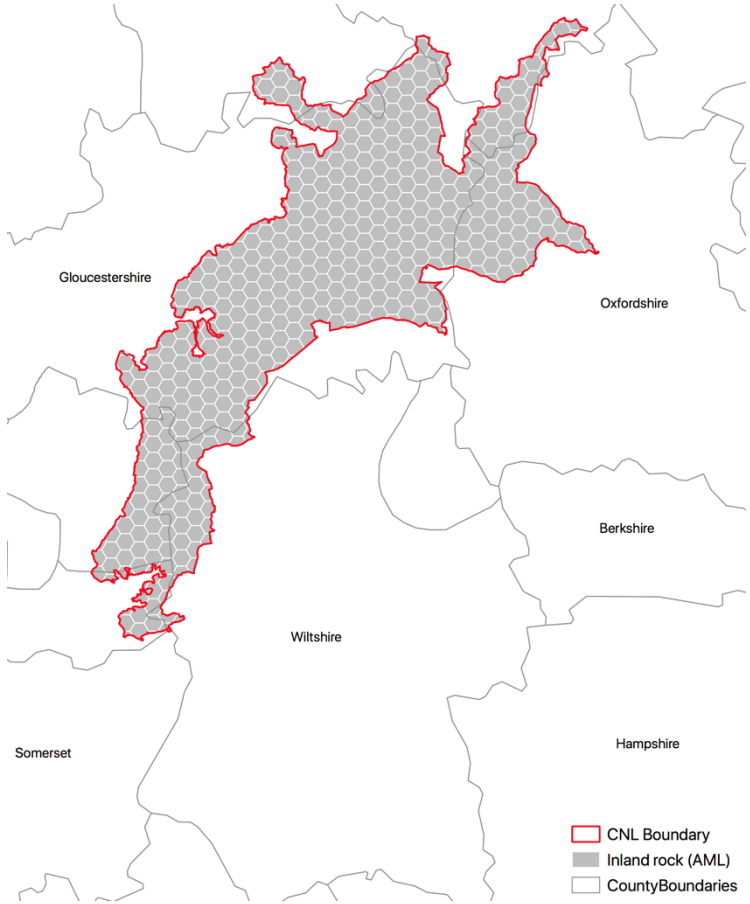
Area of dwarf shrub heath mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Inland Rock, Scree and Pavement (AML) (ID: 20)

Area of inland rock, scree and pavement AML mapped using CEH LCM2015, Natural England's Priority Habitat Inventory and Rural Payments agency (RPA)'s Moorland Line dataset.

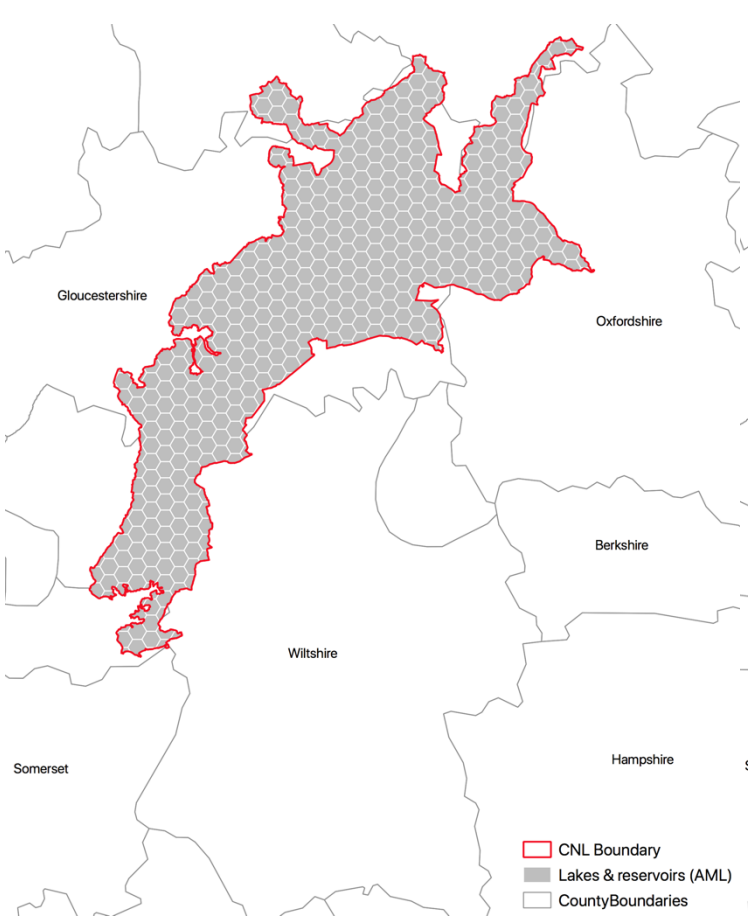


Area (km^2)

ASSET QUANTITY: Mountains, Moors & Heaths

Lakes and Reservoirs (AML) (ID: 21)

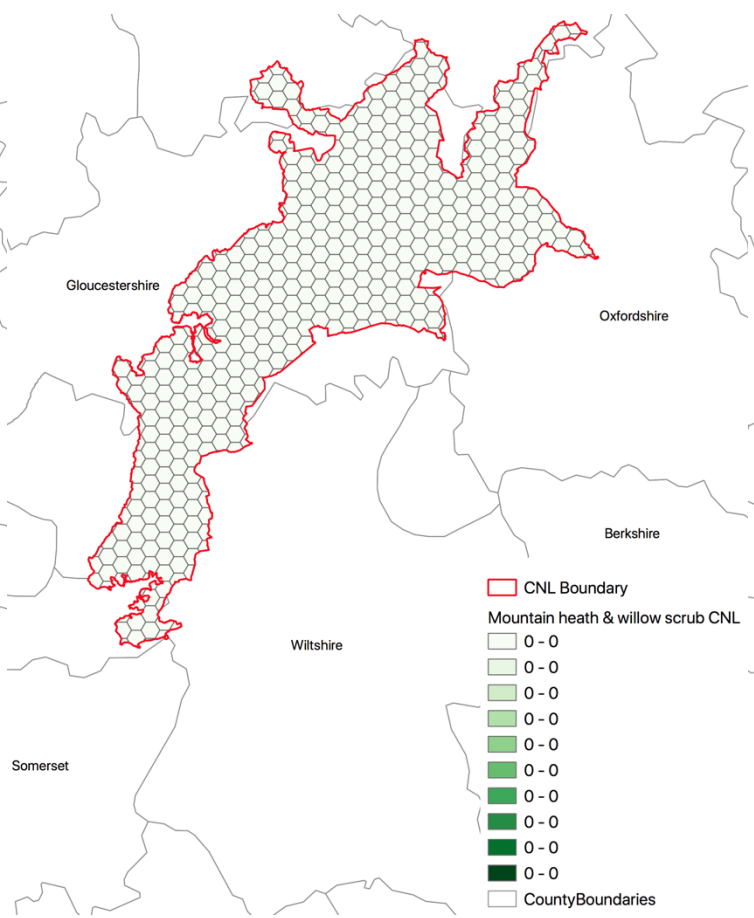
The area of lakes and reservoirs (combined) AML has been mapped using CEH's UK Lakes dataset, CEH's Inventory of UK reservoirs dataset and RPA's Moorland Line dataset.



Area (km^2)

Mountain Heath and Willow Scrub (ID: 22)

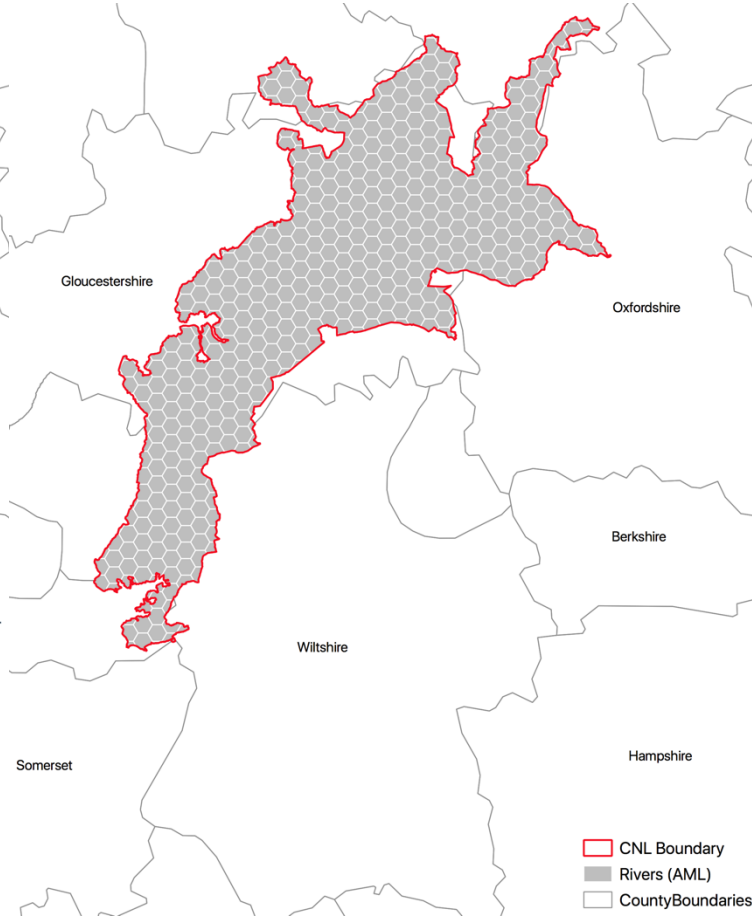
Area of mountain heath and willow scrub mapped using Natural England's Priority Habitat Inventory.



Area (km^2)

Rivers (AML) (ID: 23)

Length of rivers mapped using EA's WFD river waterbodies dataset and RPA's Moorland Line dataset.

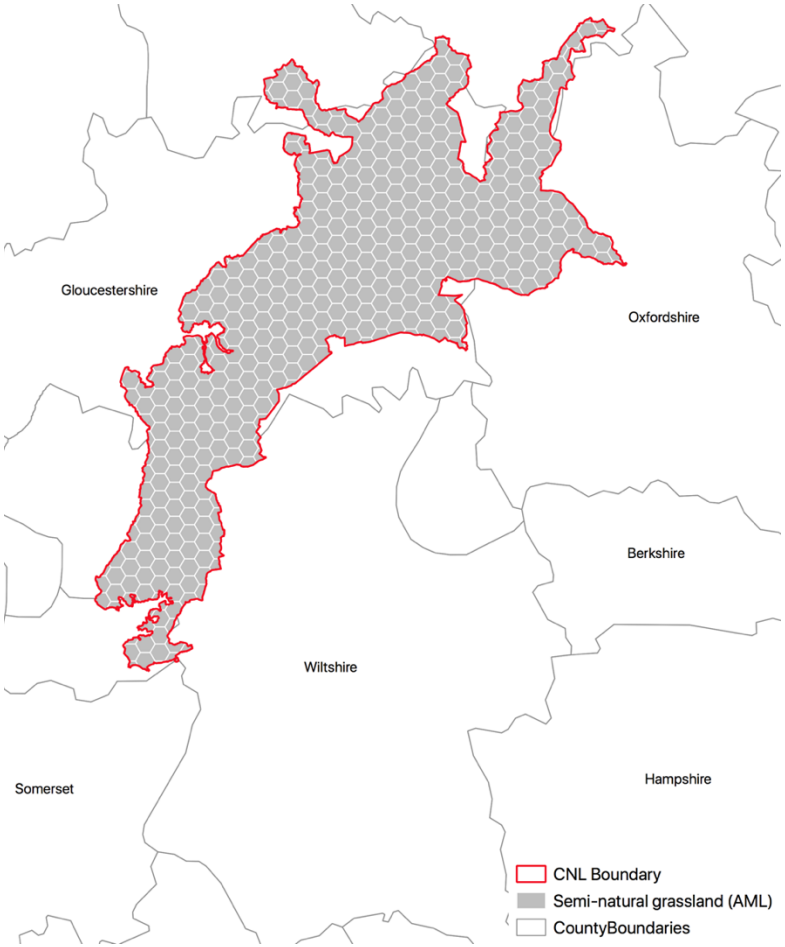


Area (km^2)

ASSET QUANTITY: Mountains, Moors & Heaths

Semi-Natural Grassland (AML) (ID: 24)

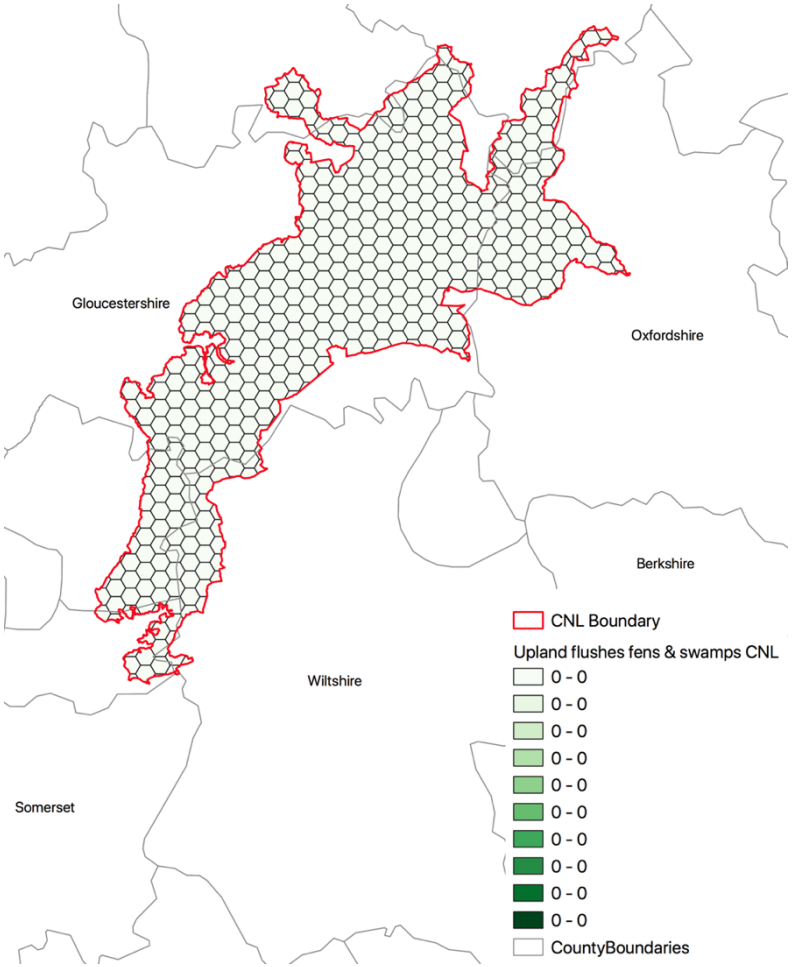
Area of semi-natural grassland mapped using Natural England's Priority Habitat Inventory and RPA's Moorland line dataset.



Area (km^2)

Upland Flushes, Fens & Swamps (ID: 25)

Area of upland flushes, fens & swamps mapped using Natural England's Priority Habitat Inventory.

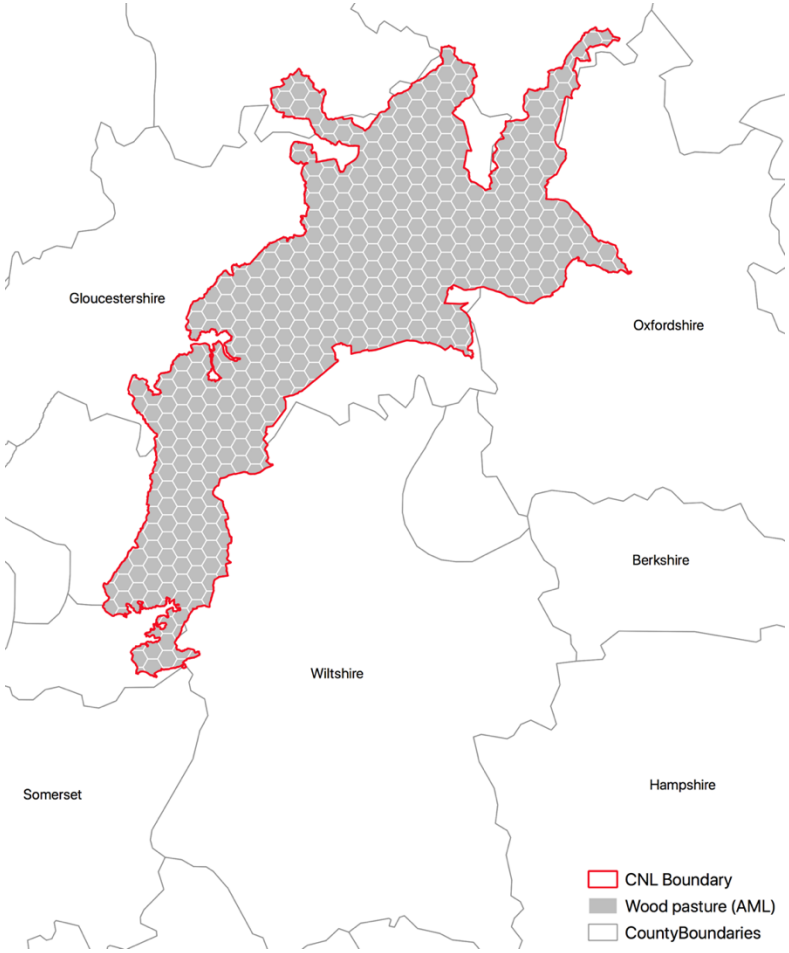


Area (km^2)

ASSET QUANTITY: Mountains, Moors & Heaths

Wood Pasture (AML) (ID: 26)

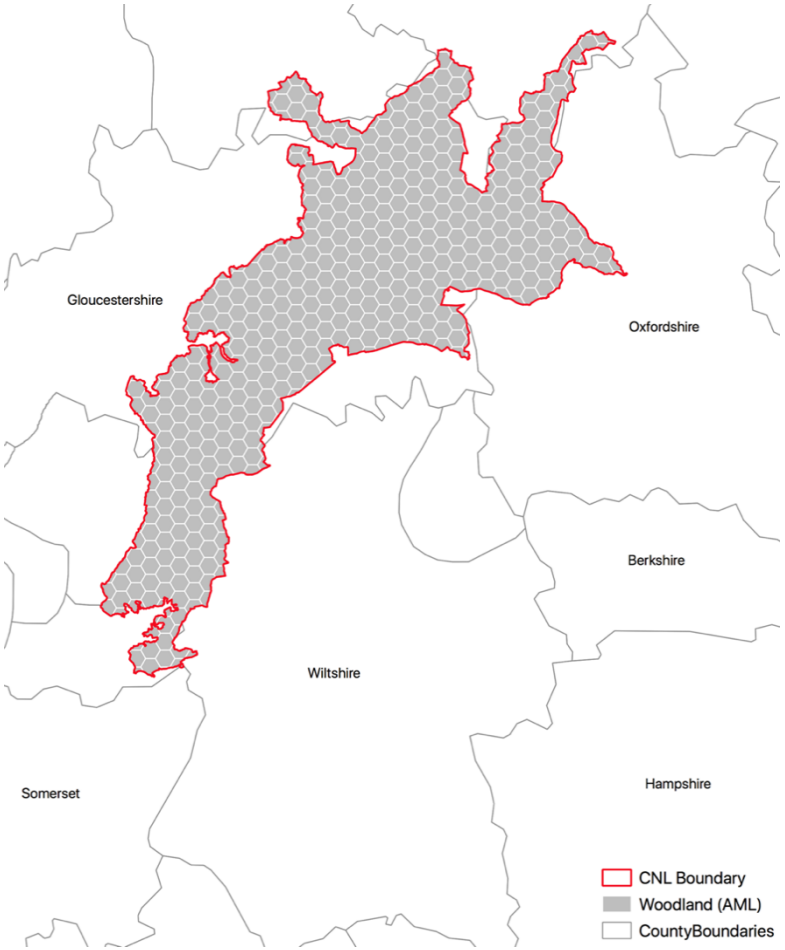
Area of wood pasture (AML) mapped using Natural England's provisional Wood-Pasture and Parkland BAP Priority Habitat Inventory and RPA's Moorland line dataset.



Area (km^2)

Woodland (AML) (ID: 27)

Area of woodland (AML) mapped using FC's National Forest Inventory and RPA's Moorland line dataset.



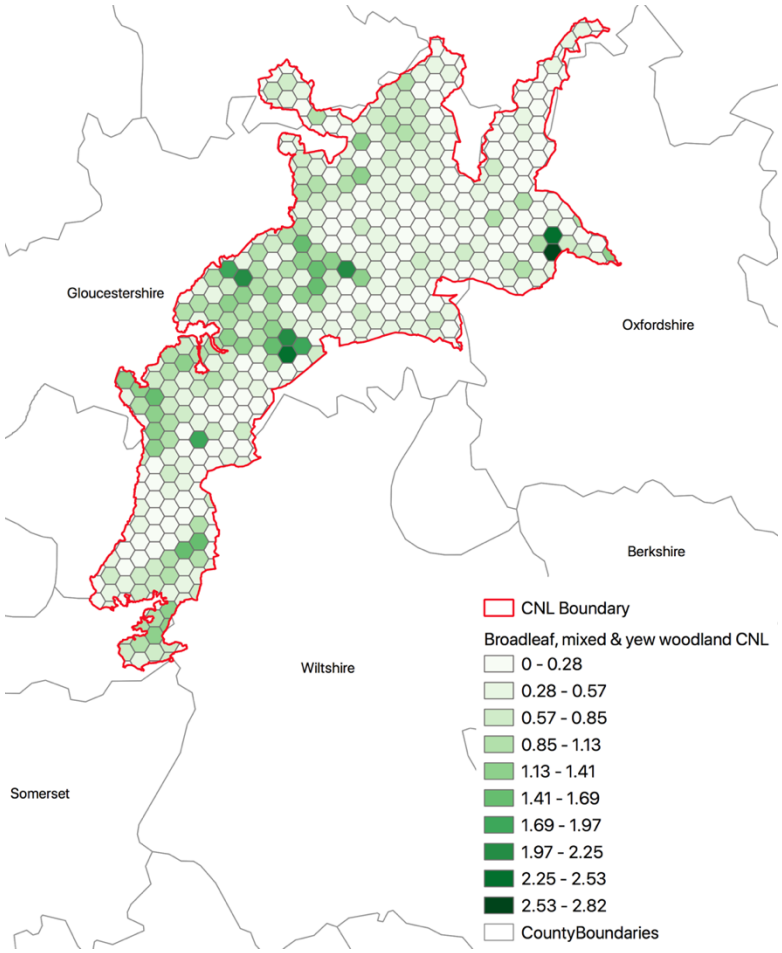
Area (km^2)

ASSET QUANTITY: Woodland

Woodland occupies 1.3 million hectares of England's land cover, 74% is broadleaved and 26% is coniferous (Forestry Research, 2018). These areas represent a very important habitat for multiple rare and threatened species.

Broadleaved, Mixed and Yew Woodland (ID: 28)

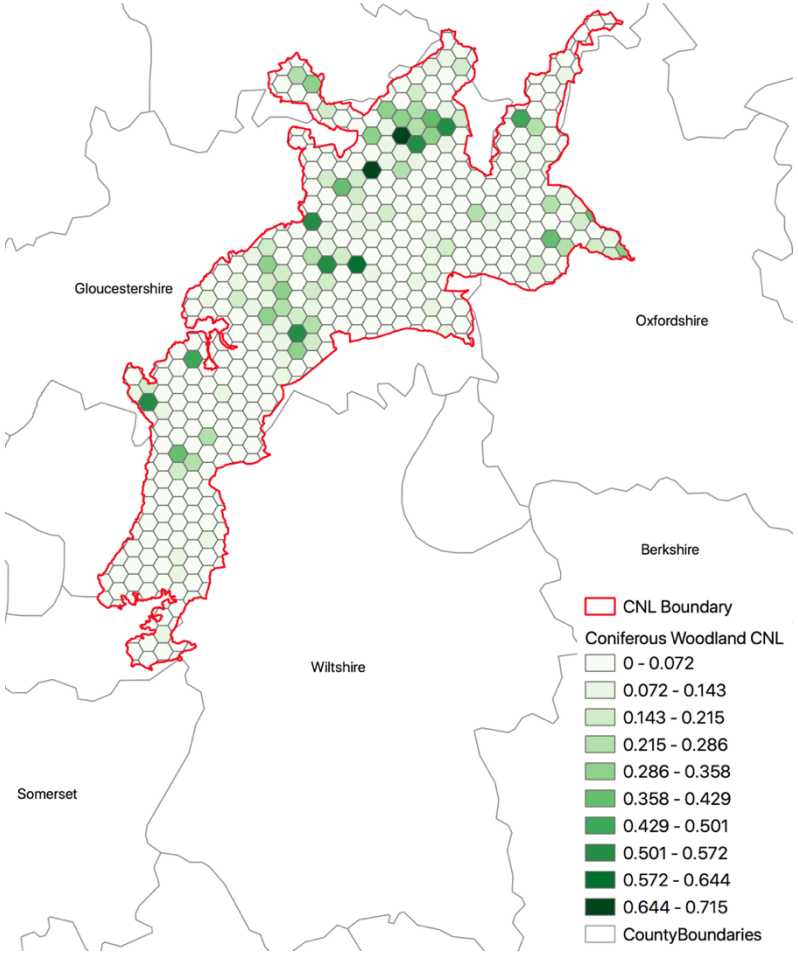
Area of broadleaved, mixed and yew woodland mapped using FC's National Forest Inventory.



Area (km^2)

Coniferous Woodland (ID: 29)

Area of coniferous woodland mapped using FC's National Forest Inventory.

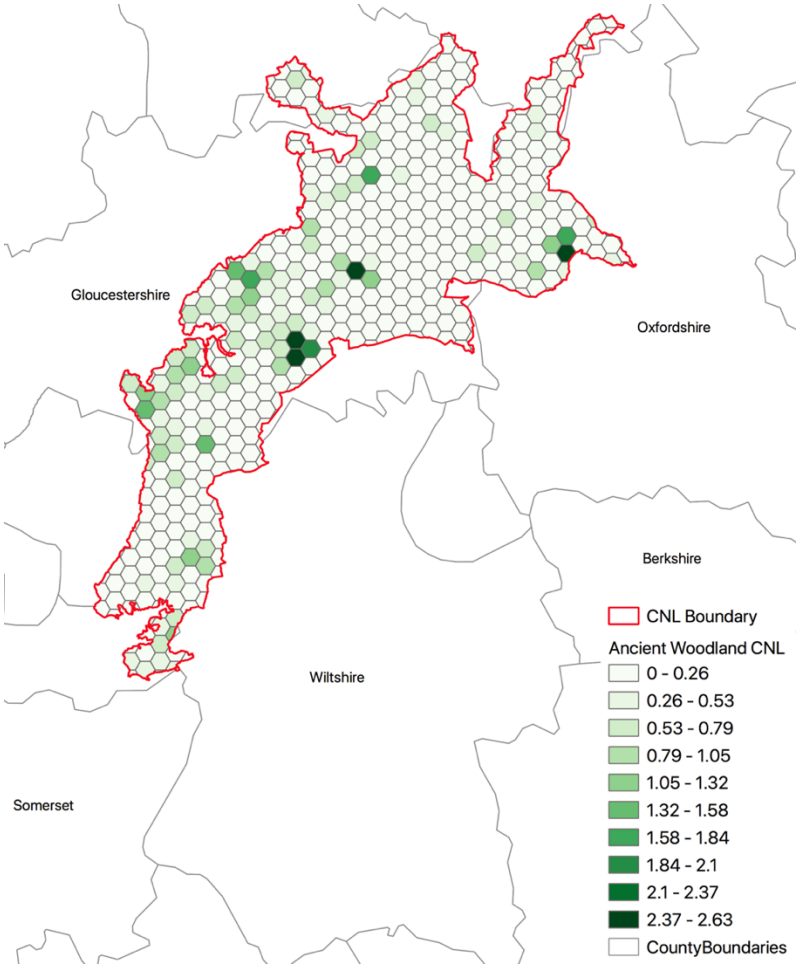


Area (km^2)

ASSET QUANTITY: Woodland

Ancient Woodland (Individual trees) (ID: 30)

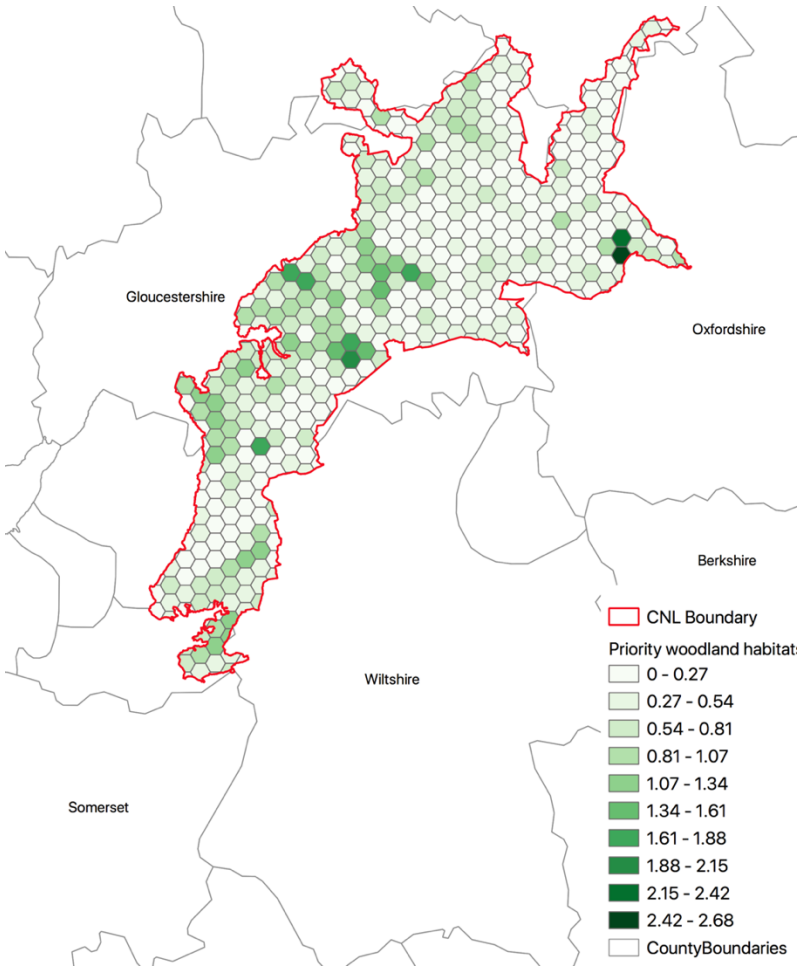
Ancient woodland mapped using Natural England's ancient woodland dataset.



Area (km^2)

Priority Woodland Habitats (ID: 31)

Area of woodland priority habitat mapped using Natural England's Priority Habitat Inventory.



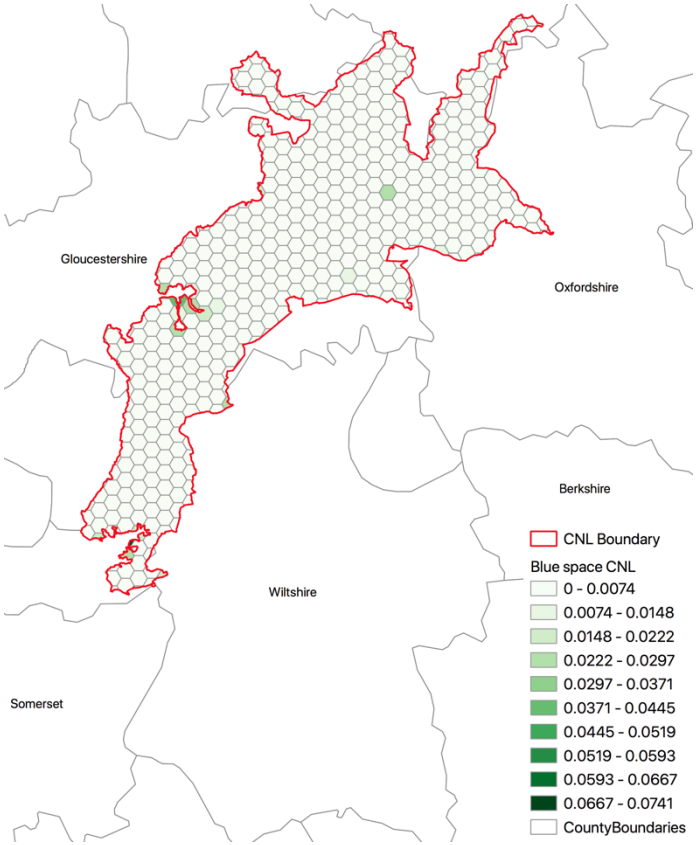
Area (km^2)

ASSET QUANTITY: Urban

Urban areas in the UK cover under 7% of land area but are home to 8 out of 10 people, living at high population densities. Urban populations are dependent on other broad habitats in rural areas for provision of most of their ecosystem services (UK NEA, 2011).

Blue Space (ID: 32)

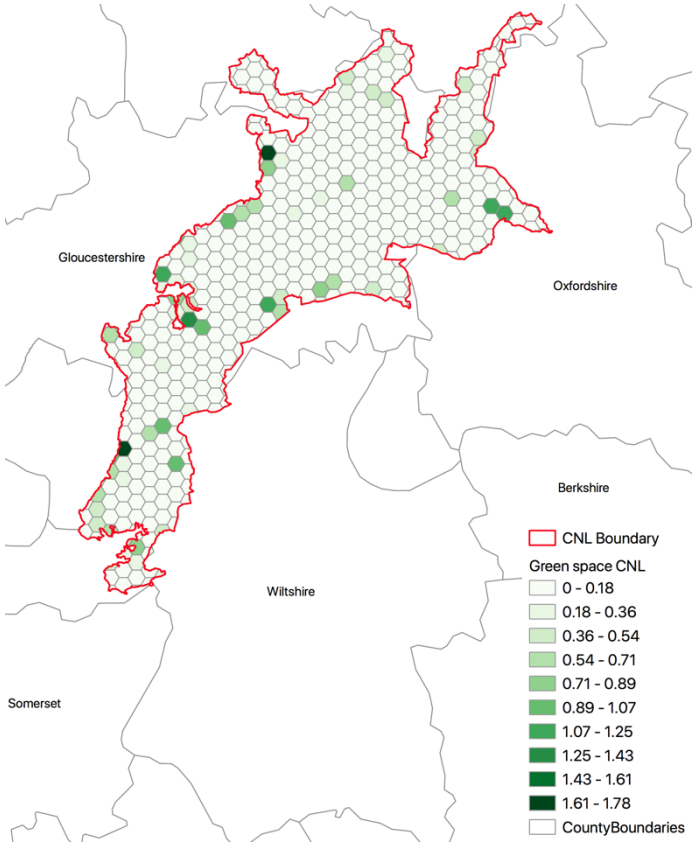
Area of urban blue space mapped by intersecting OS VectorMap District Surface Water with the Office for National Statistics (ONS)'s Built-Up areas dataset.



Area (km^2)

Green Space (ID: 33)

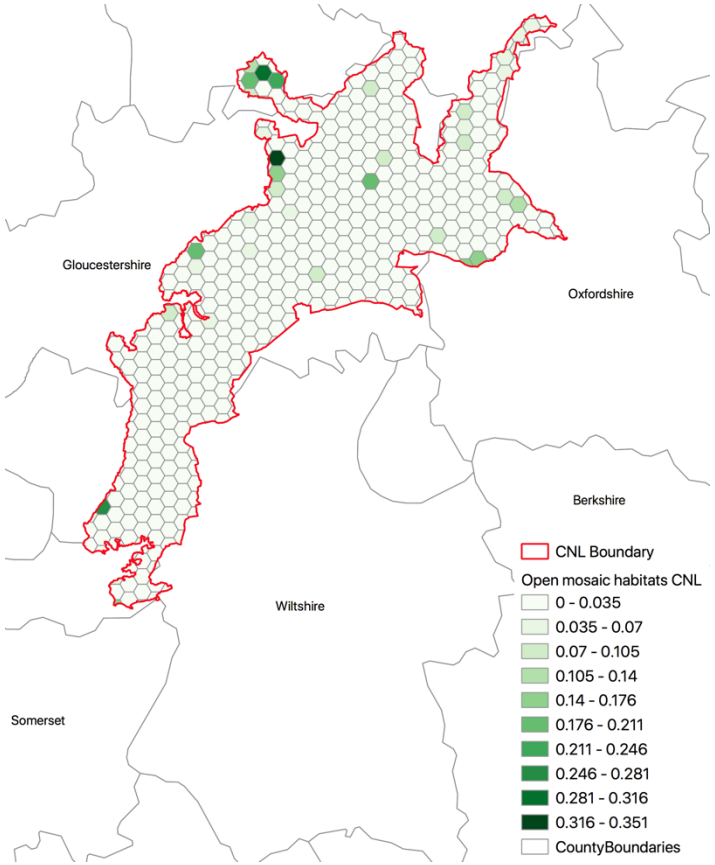
Area of urban green space mapped using the OS Open Greenspace Layer.



Area (km^2)

Open Mosaic Habitats (ID: 34)

Area of open mosaic habitats mapped using Natural England's draft Open Mosaic Habitat dataset.

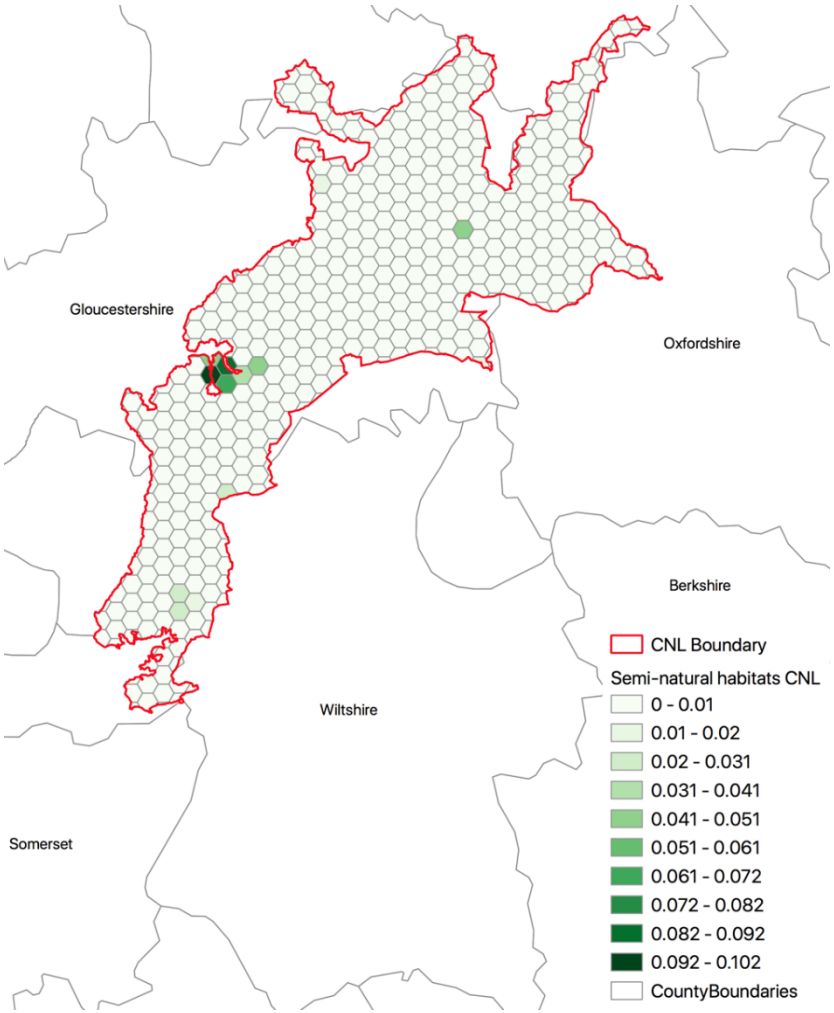


Area (km^2)

ASSET QUANTITY: Urban

Semi-Natural Habitats (ID: 35)

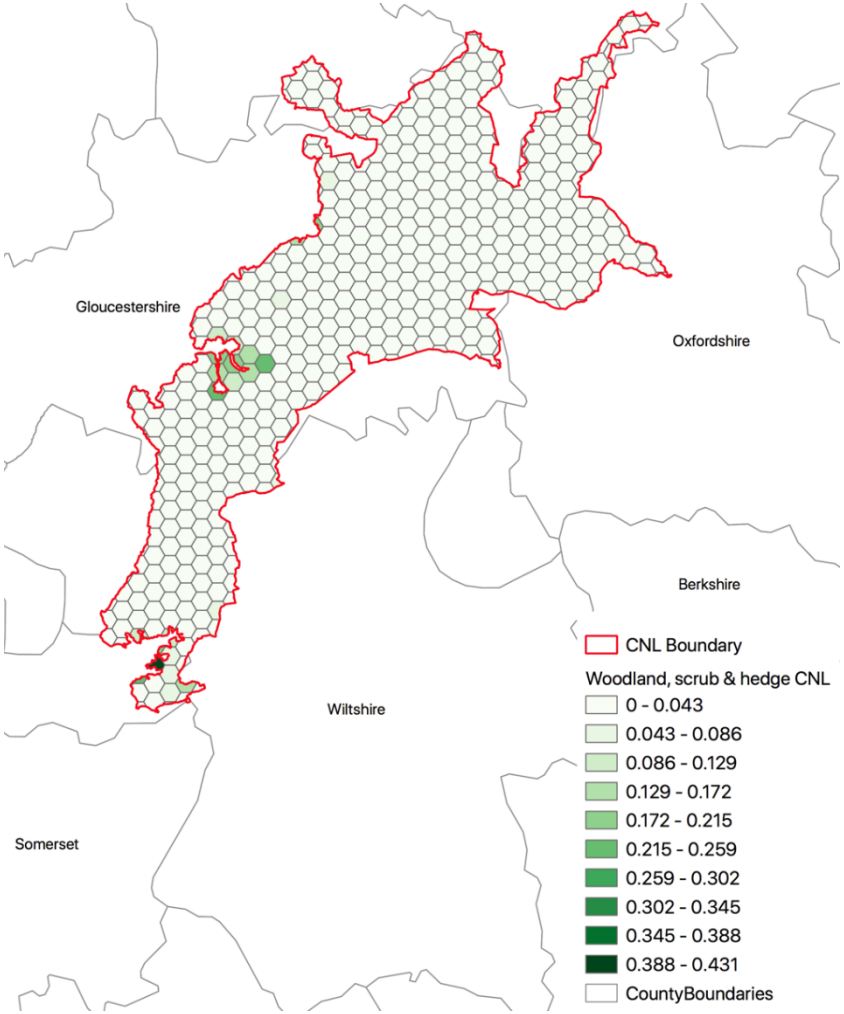
Area of urban semi-natural habitats mapped by intersecting Natural England's Priority Habitat Inventory with ONS Built-Up areas.



Area (km^2)

Woodland, Scrub and Hedge (ID: 36)

Area of woodland is mapped by intersecting FC's National Forest Inventory with ONS Built-Up areas.



Area (km^2)

ASSET QUANTITY: Stats

ID	Indicator of habitat extent	Mean value (CNL)	Mean value (England)
1	Active flood plain	0.1411 km^2	0.3176 km^2
2	Coastal & flood plain grazing marsh	0.1176 km^2	0.0598 km^2
3	Lakes & standing waters	0.0047 km^2	0.0138 km^2
4	Lowland fens	0.0128 km^2	0.0560 km^2
5	Lowland raised bog	0 km^2	0.0222 km^2
6	Rivers	1.5136 km	1.2963 km
7	Modified waters (reservoirs)	0 km^2	4.2560 km^2
8	Reedbeds	0 km^2	0.0088 km^2
9	Ponds	0.0022 km^2	0.0048 km^2
10	Blanket bog	0 km^2	0.6381 km^2
11	Woodland	0.565 km^2	0.355 km^2
12	Other semi-natural habitats	0.0909 km^2	0.1912 km^2
13	Arable & horticulture	2.1807 km^2	1.3016 km^2
14	Improved grassland	2.0153 km^2	1.1753 km^2
15	Orchards & top fruit	0.0109 km^2	0.0044 km^2
16	Meadows	0.1162 km^2	0.0067 km^2
17	Other semi-natural grasslands	0.0909 km^2	0.0866 km^2
18	Blanket bog	0 km^2	0.6381 km^2

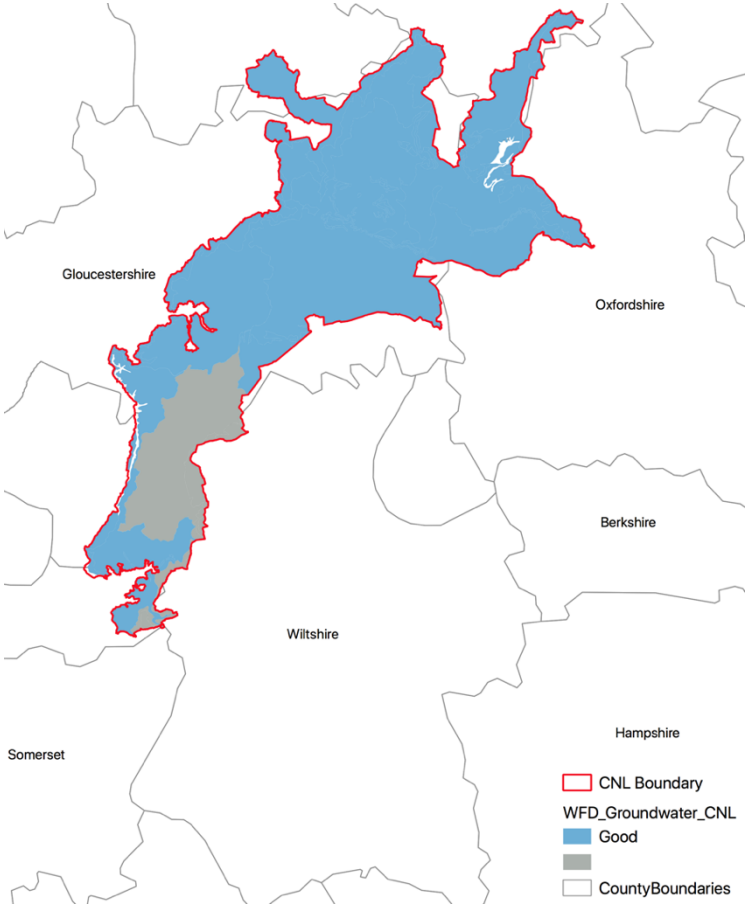
ID	Indicator of habitat extent	Mean value (CNL)	Mean value (England)
19	Dwarf shrub heath	0.0114 km^2	8.0014 km^2
20	Inland rock, scree and pavement AML	0 km^2	0.0114 km^2
21	Lakes and reservoirs AML	0 km^2	0.0013 km^2
22	Mountain heath & willow scrub	0 km^2	0.0038 km^2
23	Rivers AML	0 km	0.0006 km
24	Semi-natural grassland AML	0 km^2	0.4273 km^2
25	Upland flushes fens & swamps	0 km^2	0.0270 km^2
26	Wood pasture AML	0 km^2	0.0032 km^2
27	Woodland AML	0 km^2	0.1845 km^2
28	Broadleaved, mixed & yew woodland	0.4537 km^2	0.2303 km^2
29	Coniferous woodland	0.0651 km^2	0.0760 km^2
30	Ancient woodland	0.1903 km^2	0.0990 km^2
31	Woodland priority habitats	0.3909 km^2	0.0185 km^2
32	Blue space	0.0012 km^2	0.0021 km^2
33	Green space	0.9533 km^2	0.0838 km^2
34	Open mosaic habitats	0.0093 km^2	0.0133 km^2
35	Semi-natural habitats	0.0014 km^2	0.002 km^2
36	Woodland scrub and hedge	0.0111 km^2	0.0185 km^2

ASSET QUALITY: Hydrology and Geomorphology

The hydrology and geomorphology of habitats influence their ability to provide ecosystem services. Hydrology involved properties with water, focusing on its movement in relation to land. Geomorphology is the study of landforms, their processes, form and sediments at the earth's surface.

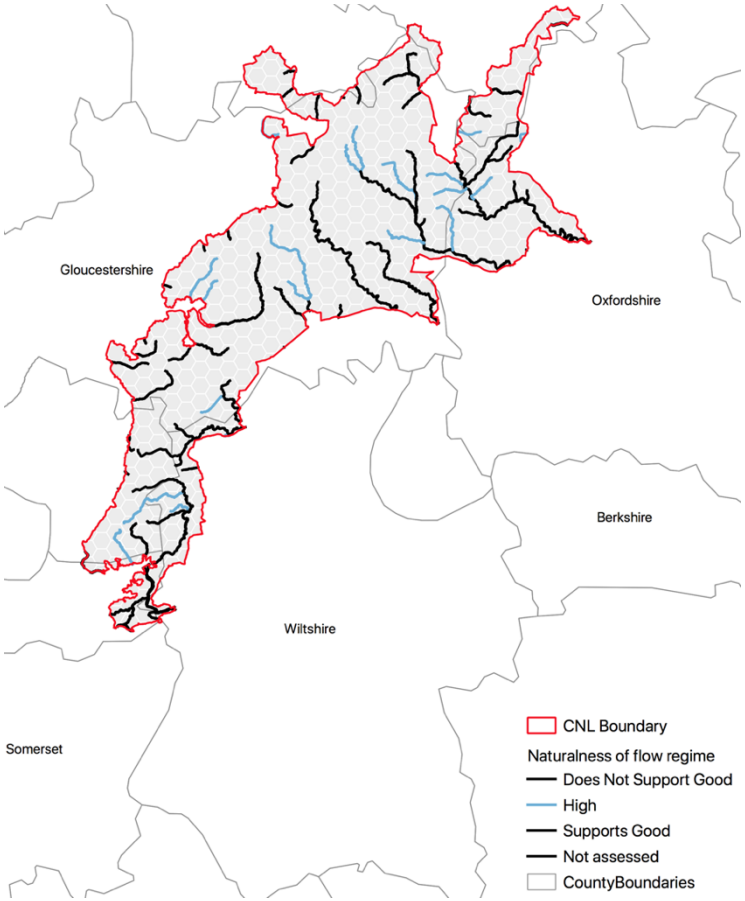
Natural Aquifer Function (ID: 51)

Area of groundwater catchment with 'good' quantitative status for WFD 2016 shown in blue and mapped using EA's WFD data and groundwater catchment boundaries.



Naturalness of Flow Regime (ID: 52)

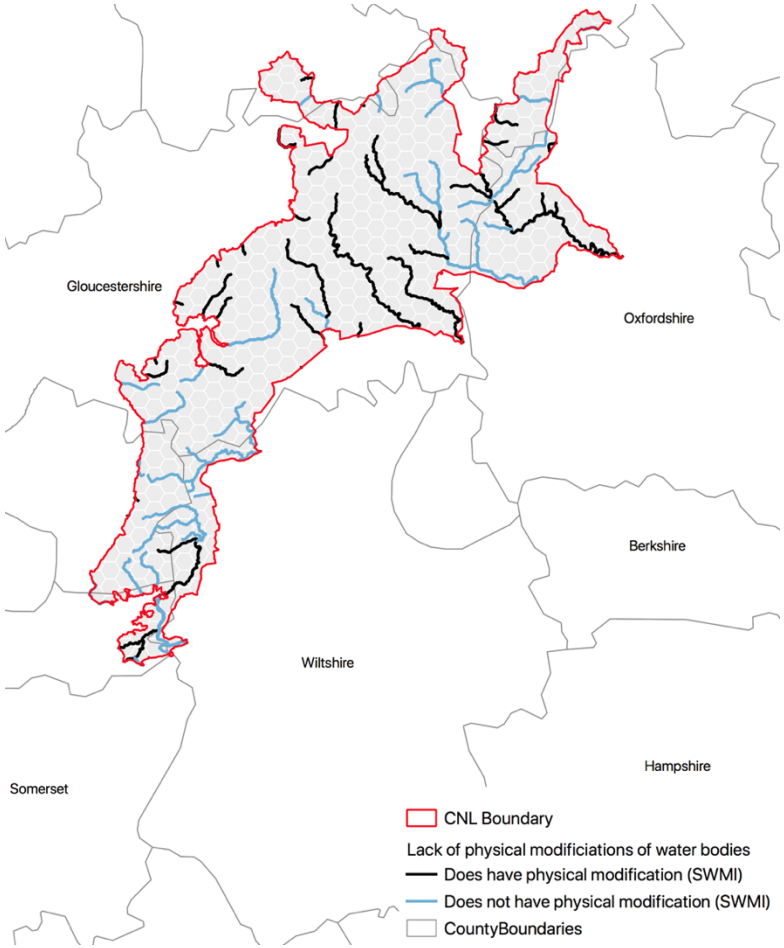
This map shows the length of river with 'high' WFD hydrological status in 2016 shown in blue and mapped using EA's WFD data and river water bodies.



ASSET QUALITY: Hydrology and Geomorphology

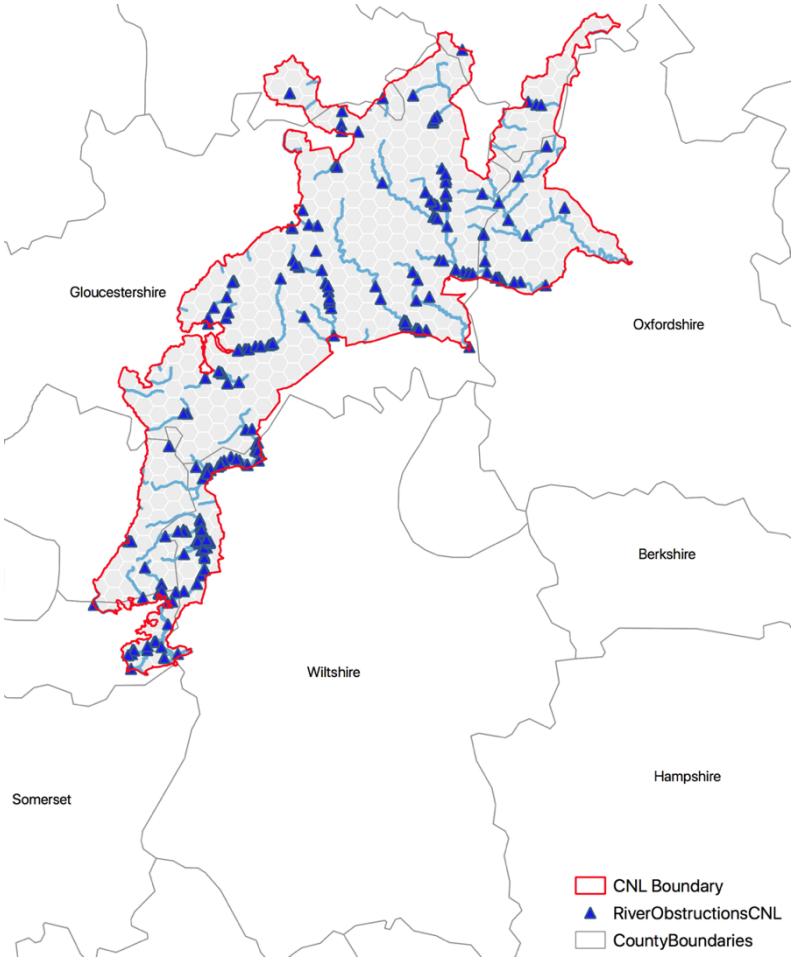
Lack of Physical Modifications of Water Bodies (ID: 53)

Lack of physical modification of water bodies, shown in blue and mapped using EA's Reasons for Not Achieving Good Status data 2013-2016.



River Continuity – Lack of Obstructions (ID: 54)

River obstructions have been mapped using EA's Potential Sites of Hydropower Opportunity dataset. Sections without river obstructions have higher river continuity.

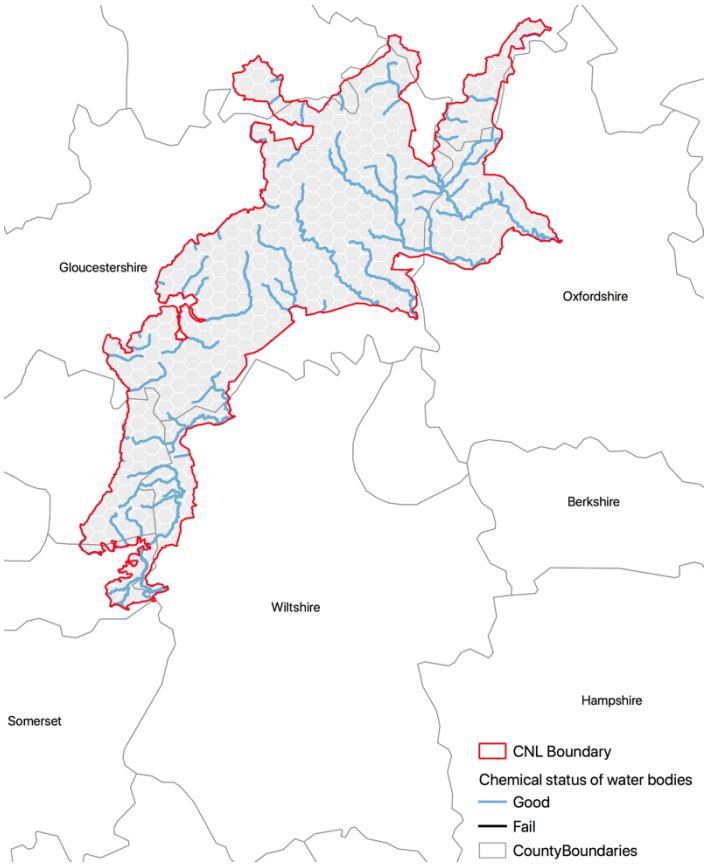


ASSET QUALITY: Nutrient & Chemical Status

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

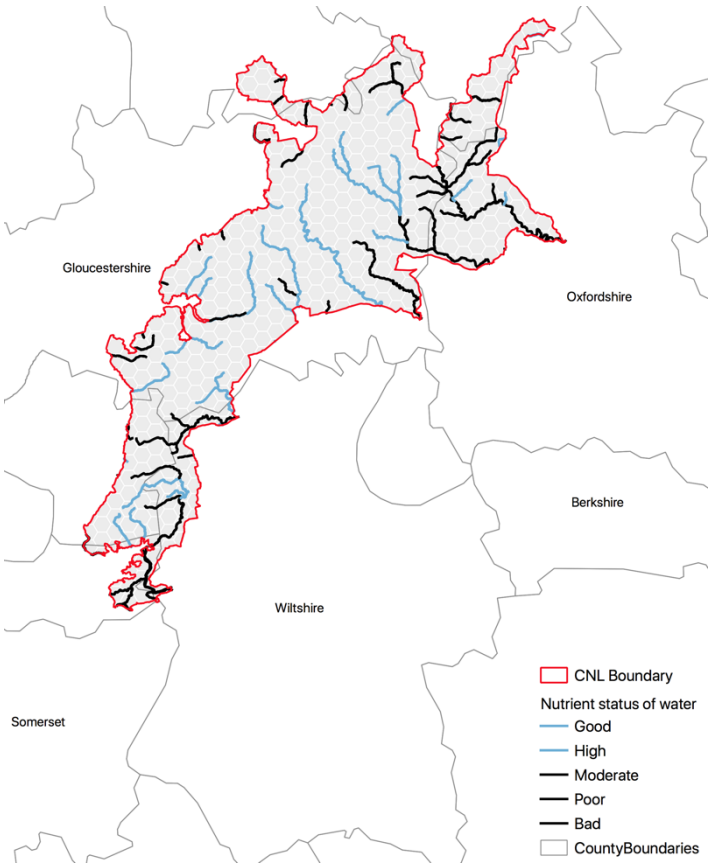
Chemical Status of Water Bodies (ID: 55)

River chemical status for WFD 2016, mapped using EA's WFD data and river water bodies.



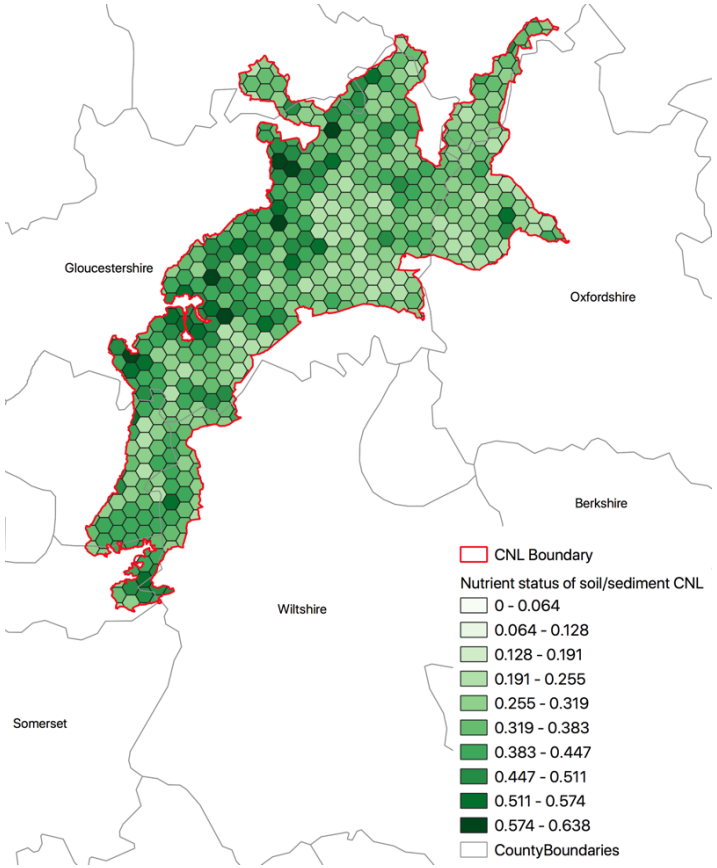
Nutrient Status of Water Bodies (ID: 56)

Length of river with 'good' or 'high' status for phosphate levels for WFD 2016, mapped using EA's WFD data and river water bodies.



Nutrient Status of Soil (ID: 57)

Mean estimates of total nitrogen concentration in topsoil - % dry weight of soil, mapped using data produced from Natural England and CEH's 'Mapping Natural Capital' project



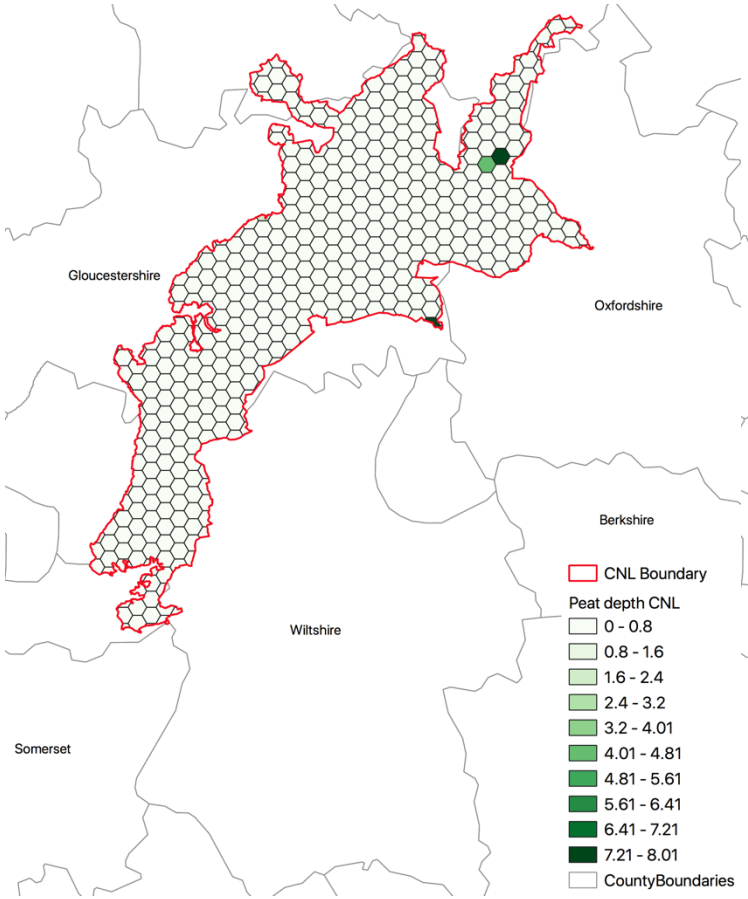
% dry weight of soil

ASSET QUALITY: Soil/Sediment Processes

The soil/sediment processes that occur in habitats influence their ability to provide ecosystem services. These processes influence factors such as peat depth, organic matter content and soil structure.

Peat Depth (ID: 58)

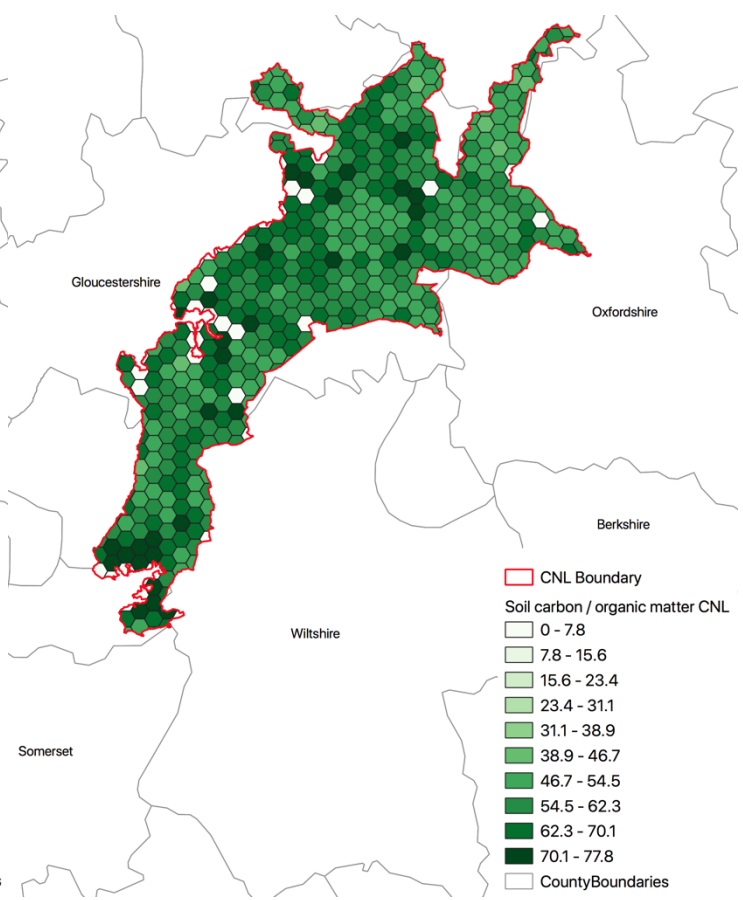
Area of deep peat mapped using Natural England's peaty soils location dataset.



Area (km^2)

Soil Carbon/Organic Matter (ID: 59)

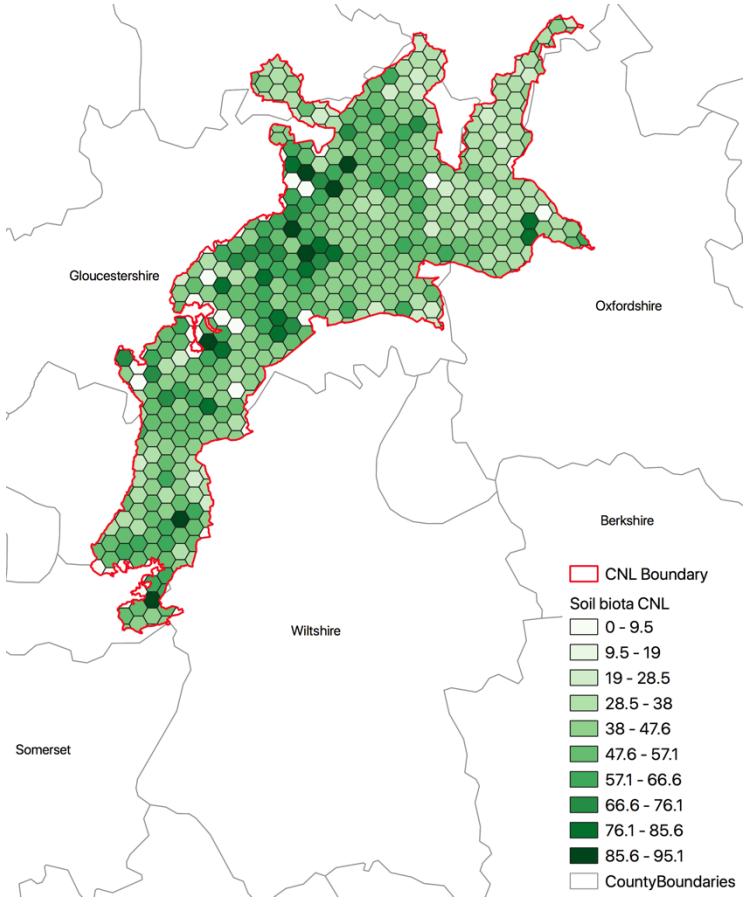
Mean estimates of carbon density in topsoil – tonnes per hectare, mapped using data produced by Natural England and CEH's 'Mapping Natural Capital' project.



Tonnes per hectare

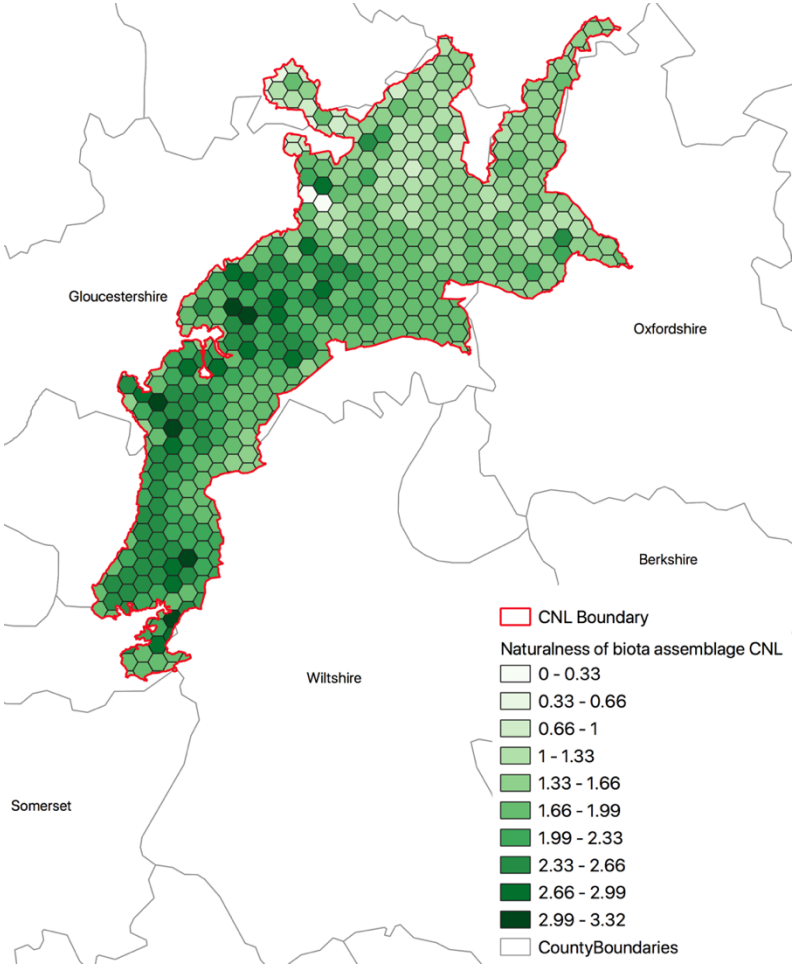
Soil Biota (ID: 60)

Mean estimates of total abundance of invertebrates in topsoil, mapped using data produced from Natural England and CEH's 'Mapping Natural Capital' project.



ASSET QUALITY: Species Composition

The species composition of habitats influences their ability to provide ecosystem services. The composition of plant and animal species present within a habitat reflects the degree of naturalness of that habitat.



% of plant habitat indicators present

Naturalness of Biological Assemblage (ID: 61)

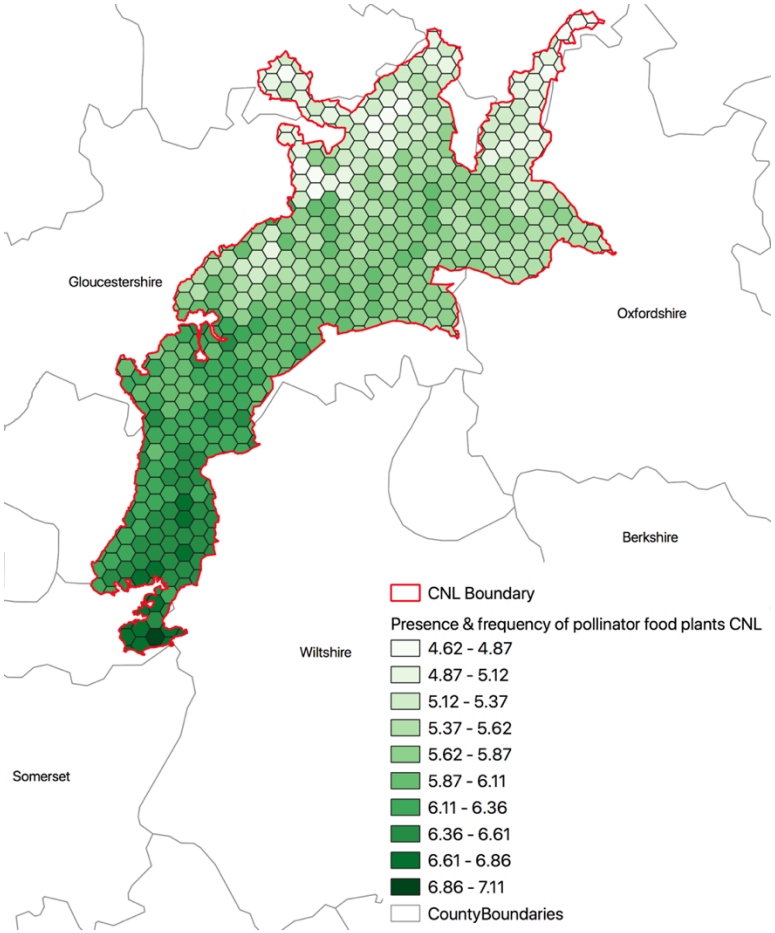
This map shows the mean estimates of expected plant habitat indicators, mapped using data produced from Natural England and CEH's 'Mapping Natural Capital' project.

ASSET QUALITY: Vegetation

The vegetation characteristics of habitats influence their ability to provide ecosystem services. Vegetation cover, structure and the presence of nectar plants are important factors influencing the provision of ecosystem service provision.

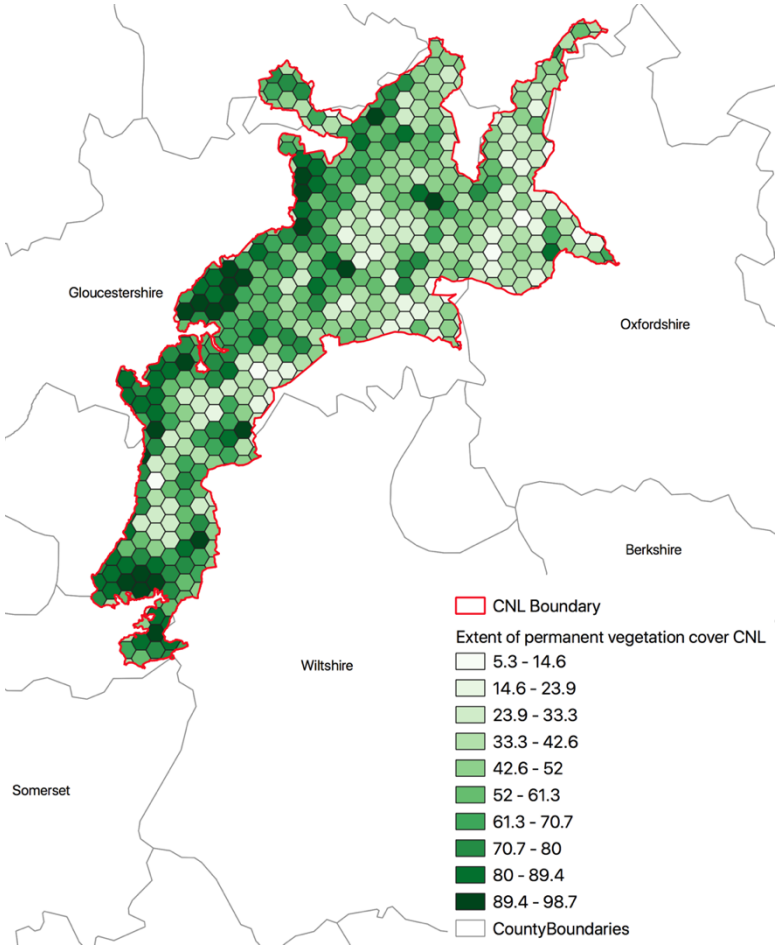
Presence & Frequency of Pollinator Food Plants (ID: 62)

Mean estimates of number of nectar plant species for bees per 2x2m plot, mapped using data produced from Natural England and CEH's 'Mapping Natural Capital' project.



Extent of permanent vegetation cover (ID: 63)

The ratio of vegetated to non-vegetated surfaces is illustrated here using CEH's Land Cover Map 2015.



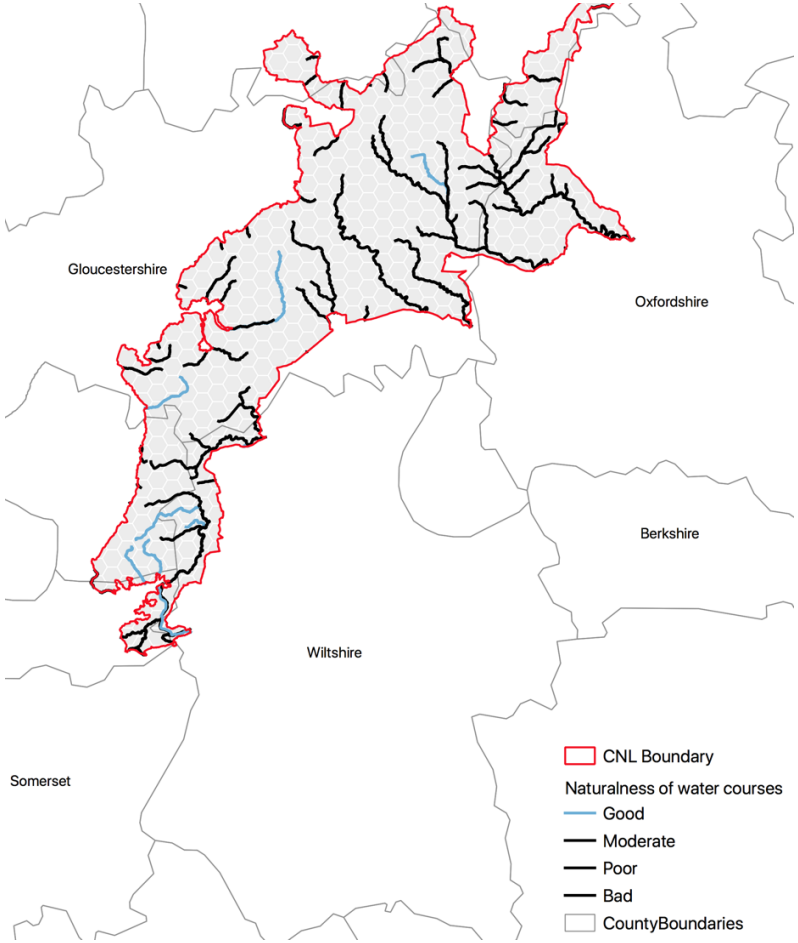
% area of each spatial unit that is vegetated

ASSET QUALITY: Cultural

There are a number of characteristics that influence the culture value that the natural environment provides to society. Landscapes and the habitats and biodiversity they support have an intrinsic value; beyond the services they deliver to human beings.

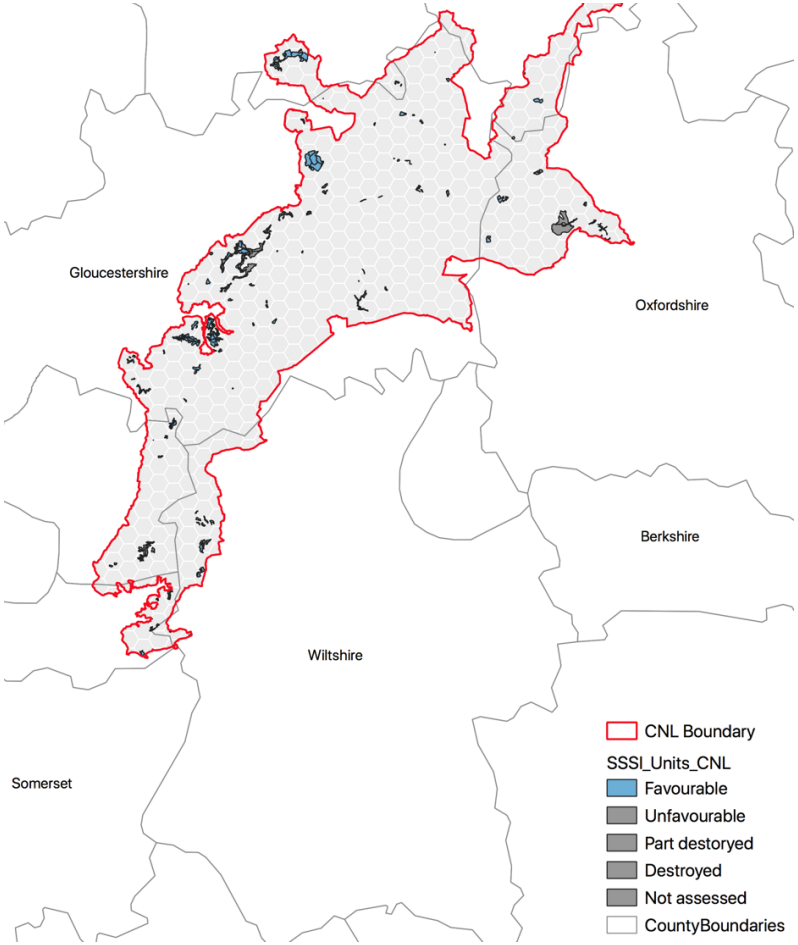
Naturalness of Watercourses (ID: 64)

WFD river 'ecological status' describes how the quality of a river compares to its natural 'reference' condition. The map shows the length of river with 'good' or 'high' WFD Ecological Status in 2016.



Favourable Condition SSSIs (ID: 65)

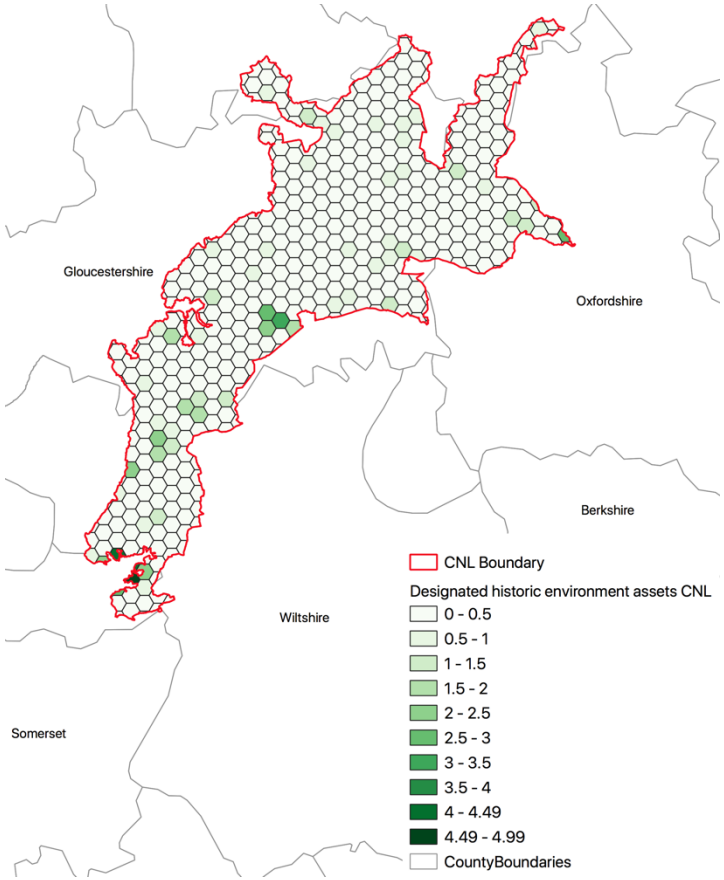
Area of SSSIs with 'favourable' condition status mapped using Natural England's SSSI Units dataset.



ASSET QUALITY: Cultural

Designated Historic Environment Assets (ID: 66)

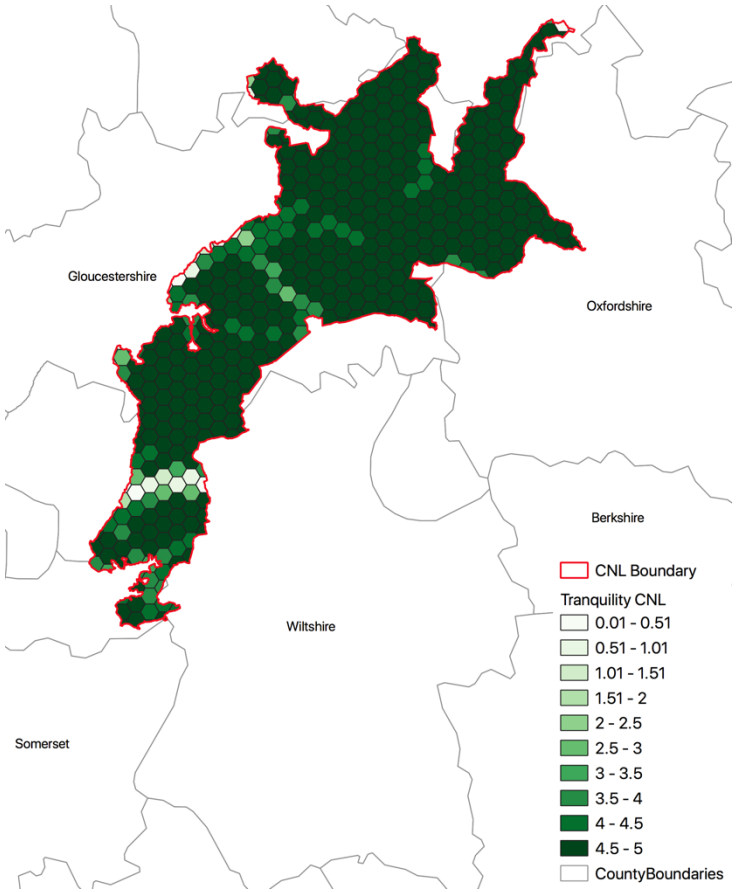
Area of designated historic environment assets mapped using Historic England's designated sites datasets.



Area (km^2)

Tranquillity (ID: 67)

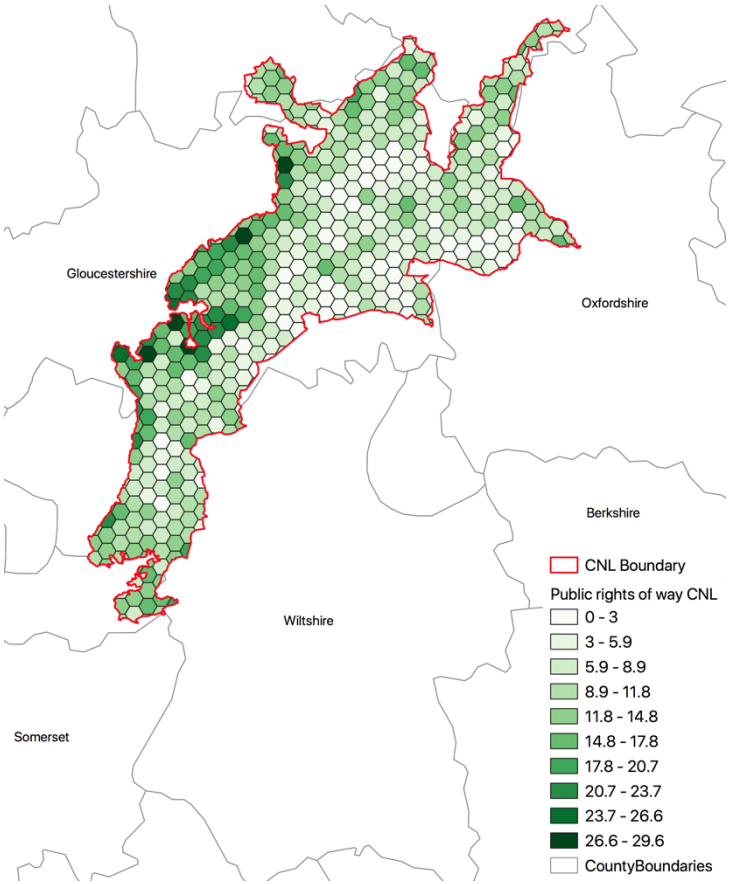
This map indicates areas where roads or rail impact on tranquillity using Defra's 2012 modelled noise map.



Area (km^2)

Public Rights of Way (ID: 68)

Length of public right of way mapped by combining open local authority datasets.



Length (km)

ASSET QUALITY: Stats

ID	Indicator of habitat extent	Mean value (CNL)	Mean value (England)
57	Nutrient status of soil	0.3469 km^2	0.2887 km^2
58	Peat depth	0.0497 km^2	18.4887km^2
59	Soil carbon/organic matter	53.008 km^2	33.355 km^2
60	Soil biota	41.265 km^2	18453.83 km^2
61	Naturalness of biological assemblage	1.7395 km^2	0.9931km^2
62	Presence and frequency of pollinator food plants	0.0909 km^2	0.1912 km^2
63	Extent of permanent vegetation cover	5.7228 km^2	3.6657 km^2
66	Designated historic environment assets	0.2073 km^2	0.1411 km^2
67	Tranquillity	4.5953 km^2	4.4657 km^2
68	Public rights of way	9.4102 km^2	4.9336 km^2

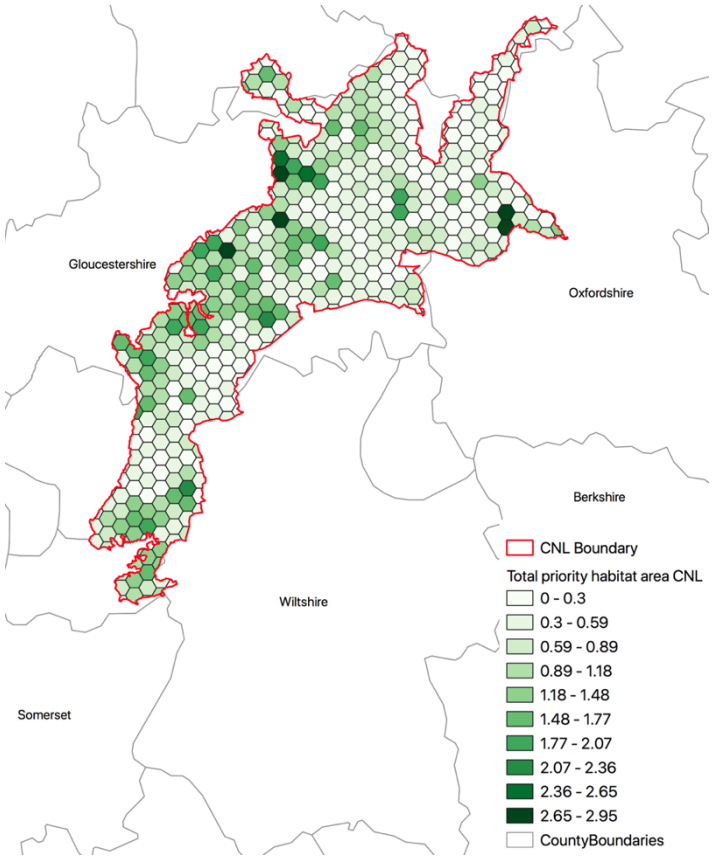
ASSET LOCATION

It is important to understand how the location of habitats in relation to other features in the landscape or beneficiaries, influences the level of service provision and also the number of people that benefit.

Patch size, shape and edge (ID: 69)

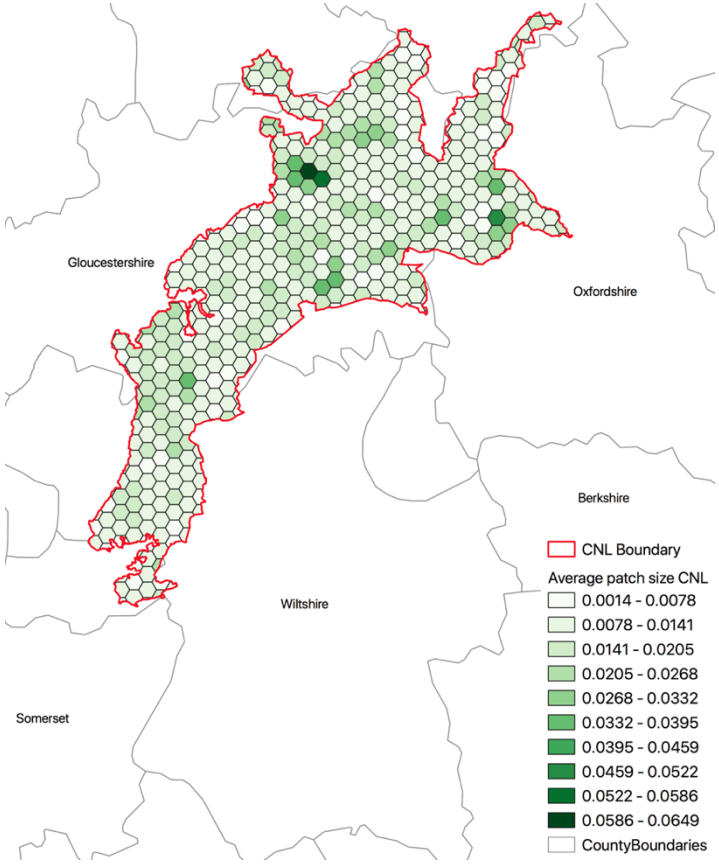
A combination of maps are included here to show average patch size and total habitat area for each spatial unit, using Natural England's Priority Habitats Inventory.

Total Priority Habitat Area



Area (km^2)

Average Patch Size



Area (km^2)

ASSET LOCATION: Stats

ID	Indicator of habitat extent	Mean value (CNL)	Mean value (England)
69	Total priority habitat area	0.6071 km^2	0.0084 km^2
69	Average patch size	0.0111 km^2	0.1573 km^2

ECOSYSTEM SERVICE FLOW

This section looks at the flow of ecosystem services from habitats to humans and attempts to measure and map this process for specific services.

Production of Crops (ID: 70)

Local Authority	Total Farmed Area (ha)	Cereals (ha)	Other farmed crops (ha)	Total crops (ha)	% of farmed area used for crops
COTSWOLD	93,887	33,543	13,151	46,694	50

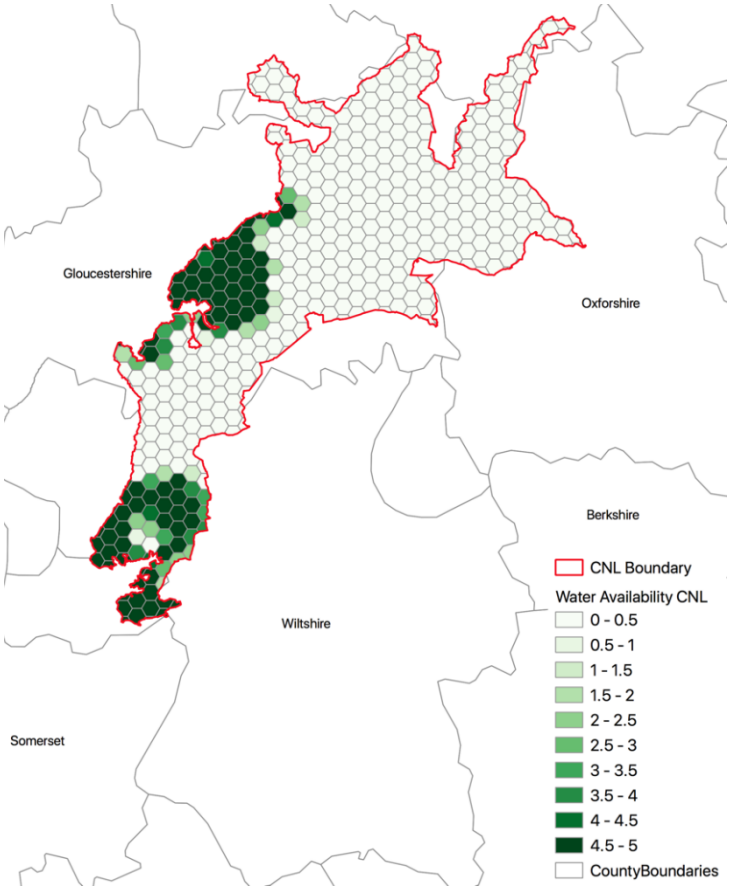
Number and Type of Reared Animals (ID: 71)

Local Authority	Cattle	Sheep	Pigs	Poultry	Total Livestock
COTSWOLD	25,293	122,387	11,179	679,163	838,022

ECOSYSTEM SERVICE FLOW

Amount of Water Available for Abstraction (ID: 72)

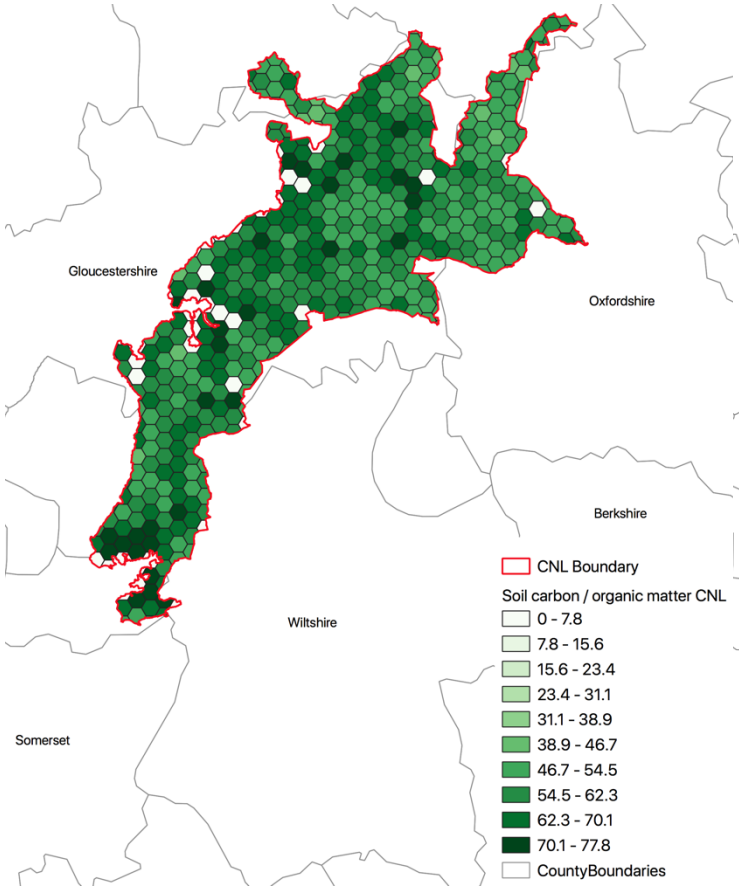
Area of land where surface water is available for abstraction at least 70% of the time, mapped using EA's Water Resource Availability and Abstraction Reliability Cycle 2 dataset.



Area (km^2)

Carbon Sequestered & Greenhouse Gases Fixed (ID: 73)

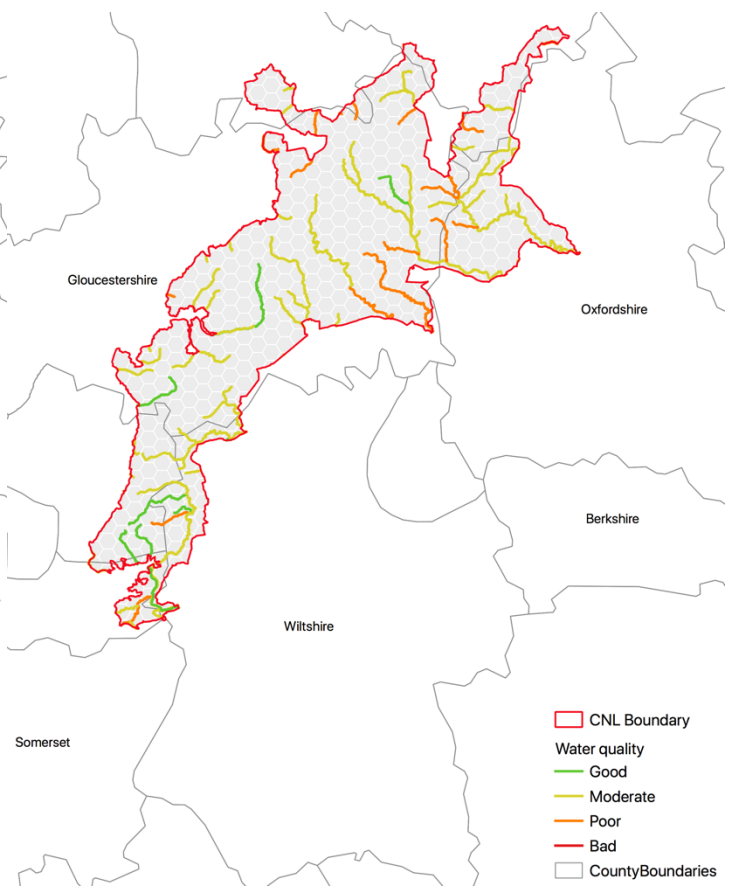
Mean estimates of carbon density in topsoil – tonnes per hectare, mapped using data from Natural England and CEH's 'Mapping Natural Capital'.



Tonnes per hectare

Water quality (ID: 74)

Overall status of rivers, canals and surface waters under the Water Framework Directive mapped using EA's WFD Cycle 2 2016 data.



ECOSYSTEM SERVICE FLOW: Stats

ID	Indicator of habitat extent	Mean value (CNL)	Mean value (England)
72	Amount of water available for extraction	1.0532 km^2	1.1393 km^2

DATA SOURCES AND REFERENCES

Centre for Ecology & Hydrology (CEH)

- Land Cover Map 2015 (13, 14, 20, 63)
  - → LCM2015 © NERC (CEH) 2011. Contains Ordnance Survey data © Crown Copyright 2007.
    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
- UK Lakes Portal (3, 21)
  - → UK Lakes Database © Centre for Ecology and Hydrology Contains Ordnance Survey data © Crown copyright and database right [2020]
    Hughes M., Bennion H., Kernan M., Hornby D.D., Hilton J., Phillips G. & Thomas R. (2004) The development of a GIS- based inventory of standing waters in Great Britain together with a risk-based prioritisation protocol. Water, Air, and Soil Pollution: Focus, 4 (2-3), 73-84. 10.1023/B:WAFO.0000028346.27904.83
- Inventory of reservoirs amounting to 90% of total UK storage (7, 21)
  - → Durant, M.J.; Counsell, C.J. (2018). Inventory of reservoirs amounting to 90% of total UK storage. NERC Environmental Information Data Centre. https://doi.org/10.5285/f5a7d56c- cea0-4f00-b159-c3788a3b2b38

Department for Environment, Food and Rural Affairs (Defra)

- Strategic Noise Mapping (67)
  - → Defra
- Structure of the agricultural industry in England and the UK at June 2016 (70,71)
  - → https://www.gov.uk/government/statistical-data-sets/structure-of- the-agricultural-industry-in-england-and-the-uk-at-june

EMODnet / Natural England / Defra

- Intertidal mudflats layer for England (39)
  - → Contains Defra information: Defra – Project MB0102

Environment Agency

- The following datasets were used in this atlas:
- Environment Agency and/or database right
  - → Saltmarsh extents (40)
  - → WFD Water Body Water Status (52, 55, 56, 64, 74)
  - → Reasons for Not Achieving Good Database (53)
  - → WFD River Waterbodies Cycle 1 (6, 23)
  - → WFD River Waterbodies Cycle 2 (52, 53, 54, 55, 56, 64, 74)
  - → WFD Groundwater Bodies Cycle 2 (51)
  - → Surface Water Resource Availability and Abstraction Reliability Cycle 2 (72)
  - → Risk of Flooding from Rivers and Sea (1)
  - → Potential Sites of Hydropower Opportunity (54)
  - → Detailed River Network (9)

Forestry Commission

- Natural forest inventory (11, 27, 28, 29, 36)
  - → Forestry commission 2020, licensed under the Open Government Licence

Historic England

- The following datasets were used in this atlas: Historic England (2020). Contains Ordinance Survey data. Crown copyright and database right (2020).
  - → Scheduled Monuments (66)
  - → World Heritage Sites (66)
  - → Registered Battlefields (66)
  - → Registered Parks and Gardens (66)

Joint Nature Conservation Committee (JNCC)

- UK Sea Map 2018 (48, 49, 50)
  - → Joint Nature Conservation Committee
- Potential Annex 1 Reefs (46)
  - → Joint Nature Conservation Committee

Natural England

- The following datasets were used in this atlas: Natural England copyright. Contains Ordinance Survey data. Crown copyright and database copyright (2020).
  - → Priority Habitat Inventory (2, 4, 5, 8, 10, 12, 15, 16, 17, 18, 19, 20, 22, 24, 25, 31, 35, 38, 41, 42, 43, 69)
  - → SSSI Units (65)
  - → Open Mosaic Habitat (Draft) (64)
  - → Wood Pasture and Parkland (26)
  - → Open Marine Evidence GDB (44, 45, 47)
  - → Ancient Woodlands (30)

Natural England and Centre for Ecology and Hydrology (CEH)

- Natural Capital Maps (57, 59, 60, 61, 62, 73)
  - → Contains data supplied by NERC – Centre for Ecology and Hydrology. Natural England Copyright.

Natural England, British Geological Survey (BGS) and Cranfield University

- Peaty Soils Location (58)
  - → Natural England License No. 2011/052
  - → British Geological Survey. NERC. All rights reserved.
  - → NSRI Cranfield University

Office for National Statistics (ONS)

- Built-up Areas (December 2011) Boundaries V2 (32, 35, 36)
  - → Contains National Statistics data. Crown copyright and database right (2020). Contains OS data. Crown copyright and database right (2020).

Ordinance Survey

- The following datasets were used in this atlas: Contains Ordinance Survey data. Crown copyright and database right (2020)

- → VectorMap District (7, 9, 21, 32, 37)
- → Open Green Space Layer (33)
- → Boundary Line

Rural Payments Agency (via MAGIC)

- Moorland Line (England) (20, 21, 23, 24, 26, 27)
  - → Contains Rural Payments Agency data. Crown copyright and database right (2020).
  - → N.b. Database used as a guide for identifying habitats above the moorland line.

Public Rights of Way Data – Multiple Sources

- The rights of way data is derived from multiple sources, directed from the rowmaps website: www.rowmaps.com
- All datasets used have open licenses (70)

Natural Capital Committee (2017) How to do it: a natural capital workbook Version 1
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608852/ncc- natural-capital-workbook.pdf

Wigley, S., Paling, N., Rice, P., Lord, A., and Lusardi, J. (2020) National Natural Capital Atlas, Natural England Commissioned Report Number 285.

Defra, DAERA (Northern Ireland), Welsh Assembly Government, The Department for Rural Affairs & Heritage, The Scottish Government, Rural & Environment Science & Analytical Services (2017). Agriculture in the United Kingdom 2016, May 2017

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Lusardi, J., Rice, P. Waters, R.D. & Craven J. (2018). Natural Capital Indicators: for defining and measuring change in natural capital. Natural England Research Report, Number 076

Natural England & Centre for Ecology & Hydrology (2017). Natural Capital Maps. The following datasets were used:

- Henrys, P.A.; Keith, A.M.; Robinson, D.A.; Emmett, B.A. (2012). NERC Environmental Information Data Centre
  - → Model estimates of topsoil invertebrates [Countryside Survey]. (http://doi.org/10.5285/f19de821- a436-4b28-95f6-b7287ef0bf15)
  - → Model estimates of topsoil carbon [Countryside Survey]. (http://doi.org/10.5285/9e4451f8-23d3- 40dc-9302-73e30ad3dd76)
  - → Model estimates of topsoil nutrients [Countryside Survey]. (http://doi.org/10.5285/7055965b- 7fe5-442b-902d-63193cbe001c)
- Maskell, L.; Henrys, P.; Norton, L.; Smart, S. (2016). NERC Environmental Information Data Centre
  - → Bee nectar plant diversity of Great Britain (http://doi.org/10.5285/623a38dd-66e8-42e2-b49f- 65a15d63beb5)
  - → Model estimates of expected diversity of positive plant habitat condition indicators (http://doi.org/10.5285/cc5ae9b1-43a0-475e-9157-a9b7fccb24e7)

Piotto, Daniel. (2008). A meta-analysis comparing tree growth in monocultures and mixed plantations. Forest Ecology and Management. 255. 781-786.
http://doi.org/10.1016/j.foreco.2007.09.065

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Sunderland, T., Waters, R.D., Marsh, D. K. V., Hudson, C., & Lusardi, J. (2019). Accounting for National Nature Reserves: A natural capital account of the National Nature Reserves managed by Natural England. Natural England Research Report, Number 078

UK National Ecosystem Assessment (2011). The UK National Ecosystem Assessment: Synthesis of the Key Findings. UNEP-WCMC, Cambridge

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