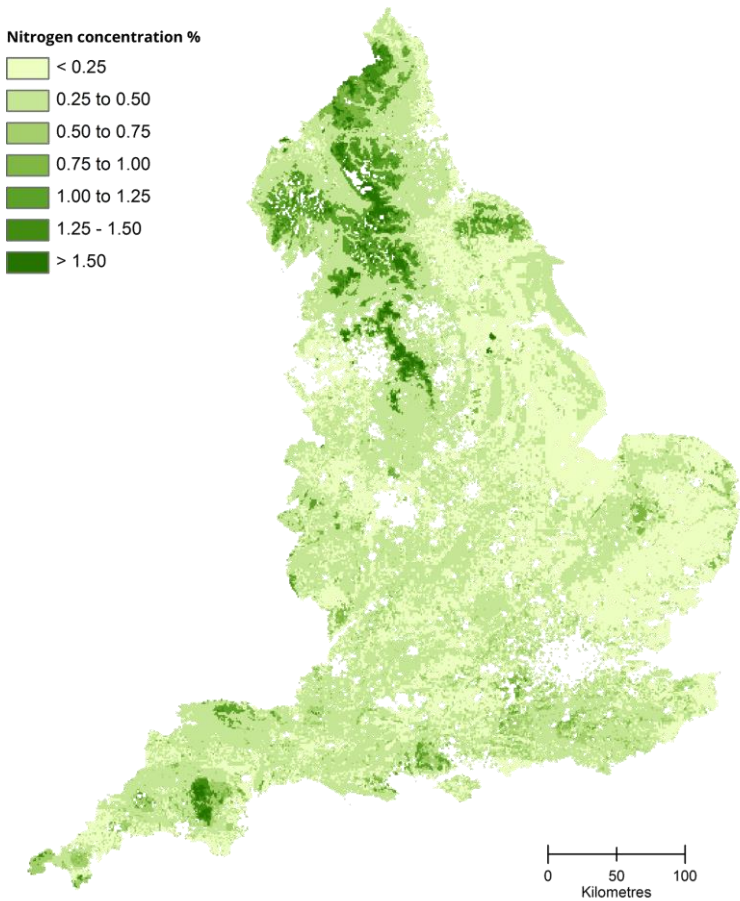
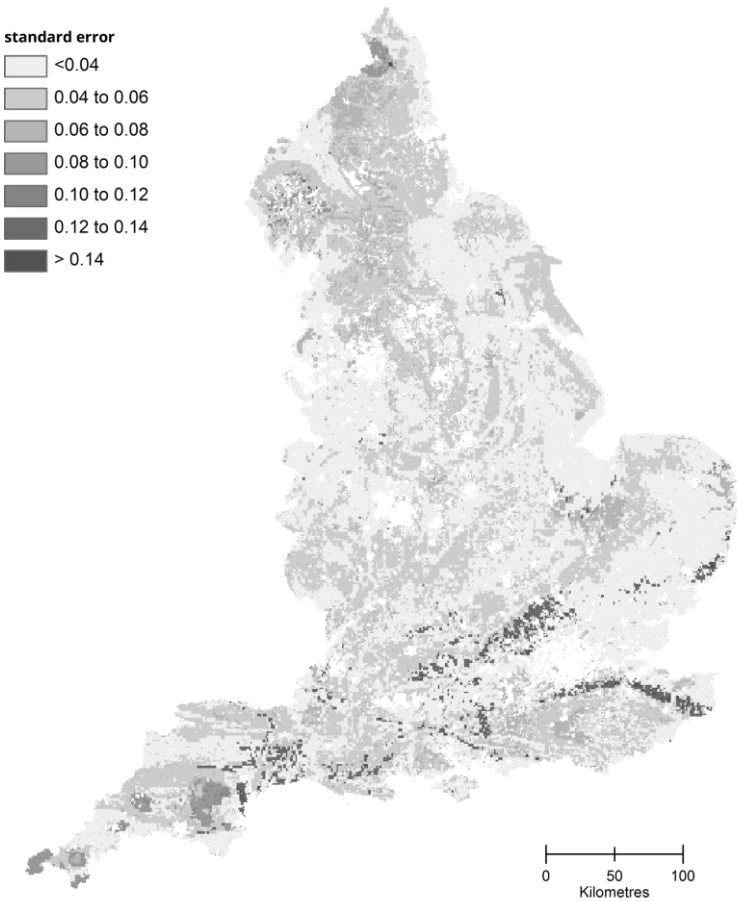


Soil nitrogen

Mean estimates of total nitrogen concentration in topsoil  
(0-15cm depth)



Uncertainty: Standard error from the mean estimates



## Soil nitrogen

### Mean estimates of total nitrogen concentration in topsoil (%).

#### What does this map show?

Mean estimates of total nitrogen concentration in topsoil (0-15cm depth) in percent dry weight of soil. Soil total nitrogen concentration is a basic measurement of soil fertility and along with soil organic carbon, plays a key role in soil formation processes.

The UK National Ecosystem Assessment (UKNEA 2011) recognises soil nitrogen as a key component of natural capital for supporting ecosystem services, in particular nutrient cycling, as well as soil formation and primary production. The supporting services underpin the delivery of provisioning and regulating ecosystem services; soil nitrogen particularly influences food, fibre and energy from agriculture and forestry, water quality and soil quality. The UK NEA notes that nitrogen enrichment from fertilisers and atmospheric deposition has resulted in substantial changes in plant productivity, plant species diversity and composition and an accelerated rate of nitrogen cycling.

This map shows that the greatest concentrations of total nitrogen in topsoil may be found in upland areas, rather than in lowland improved agricultural areas as might be expected. This is potentially due to the large amounts of nitrogen locked up in organic matter in these areas. Nitrogen held in organic matter within peat soils, such as these, is not generally considered to be readily available for plant growth.

The map reflects that the greatest soil total nitrogen concentrations were found in acid grassland, dwarf shrub heath and bog habitats in England [\[1\]](#). The lowest concentrations were in arable land and Improved grassland [\[1\]](#). Factors that could influence soil nitrogen concentration include the use of nitrogen fertilisers, atmospheric nitrogen deposition and the interaction between the vegetation and the soil in cycling of nutrients to respond to changes in nitrogen availability. Soil total nitrogen is relatively insensitive to short-term changes, but over a longer time period gives an overall indication of trends in soil fertility and changes in nutrient status in relation to other parameters such as carbon.

Soil nitrogen has high spatial variability. The standard error map gives an indication of the uncertainty in the estimated values shown on the mean total nitrogen map; the greater the standard error the greater the uncertainty.

#### How was this map produced?

This map was produced by using measurements of nitrogen concentration from soil collected in the Centre for Ecology & Hydrology Countryside Survey (2007), at 1024 sample locations across GB within 256 1km squares. Measurements were extrapolated up to a national level using statistical analysis. This extrapolation was based on total nitrogen concentration values associated with a combination of habitat type and soil parent material: the geological material, bedrock, superficial and drift, from which soil develops.

### What are the limitations of this map?

1. Areas such as urban and littoral rock are not sampled by Countryside Survey and therefore have no associated data. These areas are shown in white on the map.
2. In some circumstances sample sizes for particular habitat/parent material combinations were insufficient to estimate mean values. These areas are also shown in white on the map.
3. The map shows mean values at a 1 km square resolution. The standard error attributed to the mean estimates is only valid at 1km square resolution. The standard error at different resolutions is unknown.
4. The values for each 1 km square are generated from a statistical model of samples from approximately 256 1 km squares. Hence the map does not show direct measurements at all locations.

### Further detail on the steps for creating this map

1. Top soil (0-15cm depth) cores were taken from 1024 Countryside Survey sample locations within 256 1km squares [\[1,2\]](#).
2. Total nitrogen concentration was calculated for each soil core. [\[1,2\]](#).
3. Areas of each unique combination of broad habitat (as documented by JNCC [\[3\]](#)) and parent material were identified using data derived from the Land Cover Map 2007 [\[4\]](#) and Parent Material Model 2009 [\[5\]](#), respectively for each 1km square.
4. Values for total nitrogen concentration from Countryside Survey sampled locations were then combined with habitat/parent material data.
5. Using a statistical model (a generalized additive model [\[6\]](#)), a mean estimate of total nitrogen concentration for each unique combination of habitat and parent material, was extrapolated across the whole of England.
6. The statistical model was also used to produce an associated standard error map. High values reflect high variability and hence greater uncertainty in the mean estimates.

### How to obtain the data

Data can be downloaded from <https://eip.ceh.ac.uk/naturalengland-ncmaps>.

Reuse of the data is subject to the terms of the [Open Government Licence](#) and you must cite:

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>

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