The geology and wildlife importance of Leziate Parish

Ash Murray (W.Norfolk Reserves Manager)

- Geology and soils
- Hydrology
- Species & habitats
- Future

Geology fundamentally underpins what we see around us:

- **Hydrology** – surface flows (volumes, frequency of flows, chemical properties)
- **Soil types** – physical and chemical characteristics
- **Habitats and species** – environmental niches
- **Vernacular architecture** – as mini-exposures provide location-specific habitats

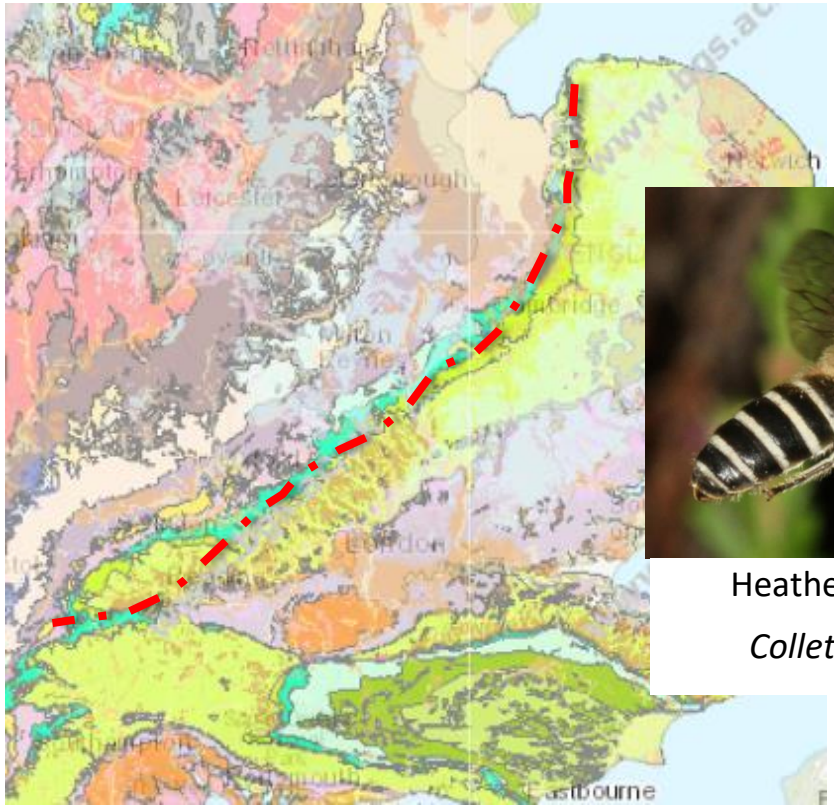
Geological connectivity within the landscape

- Corridors of similar soils and hydrological conditions for species and habitats to spread **along.**
- Provide ecological resilience – spreading room for species to shift **across** environmental gradients e.g. to wetter areas in times of drought.

Bedrock geology of East and South East England.
www.geologyviewer.bgs.ac.uk

3

Geologically defined population distributions – a heathland specialist



Bedrock geology of East and South East England.
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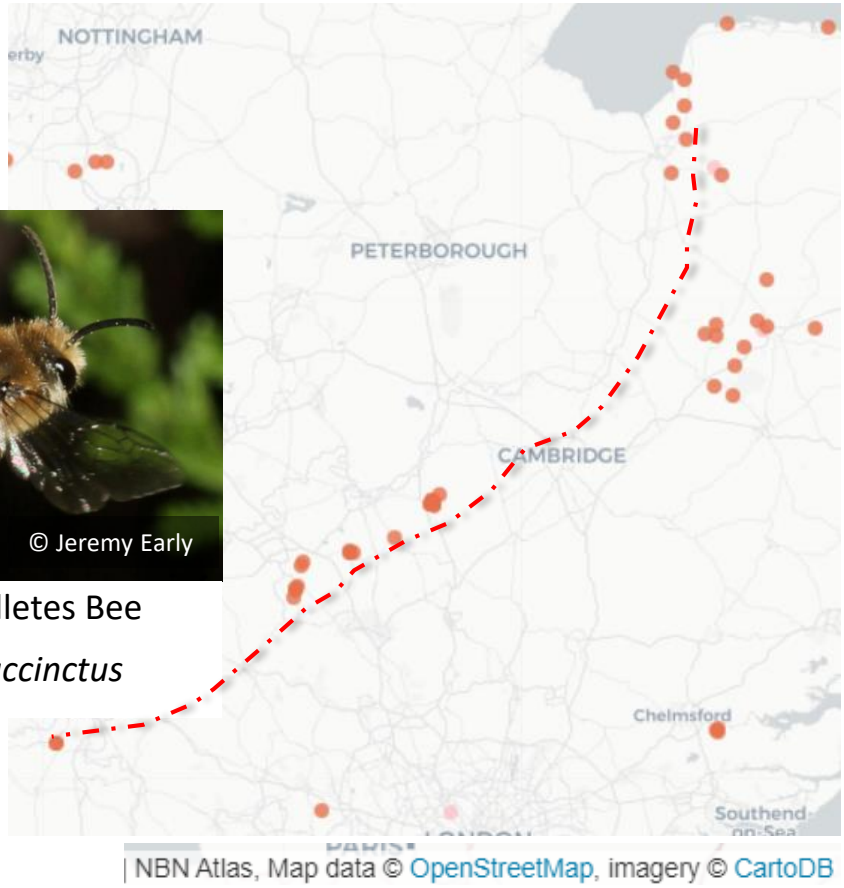
Heather Colletes Bee

Colletes succinctus



Norfolk's bedrock geology

- All Norfolk's bedrock is sedimentary
- Strata dip gently to east
- Strata get progressively younger as one travels east
- Physical and chemical properties of strata are very different
- Massive influence on habitats and species

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Norfolk's superficial geology

- Youngest deposits
- Variable depth, consistency and composition
- Locally impact hydrology and soils
- Add complexity to species & habitat distributions

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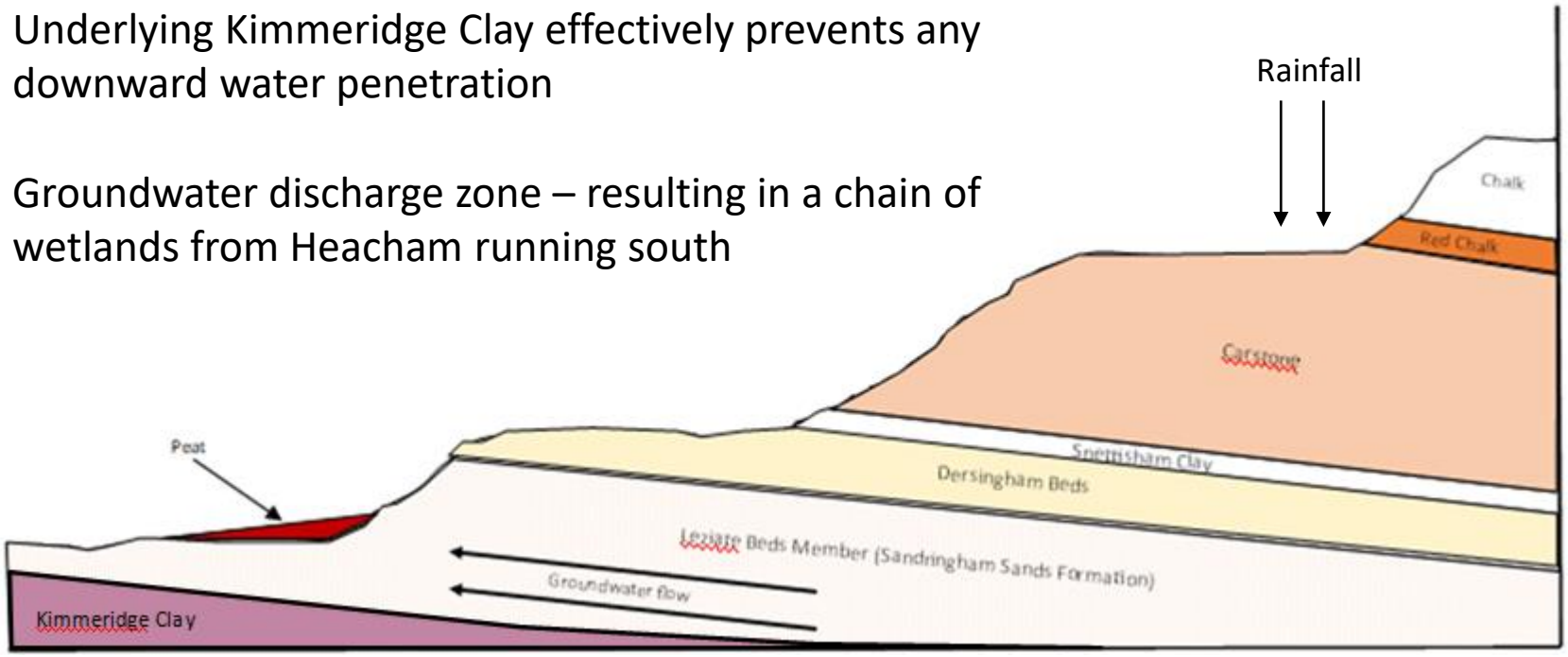
Effects of Geology on Hydrology – Greensand aquifer

- Sands and sandstones – free-draining, low pH, nutrient poor
- Mudstones (Snettisham Clay) – local impedence of water flows
- Underlying Kimmeridge Clay effectively prevents any downward water penetration
- Groundwater discharge zone – resulting in a chain of wetlands from Heacham running south



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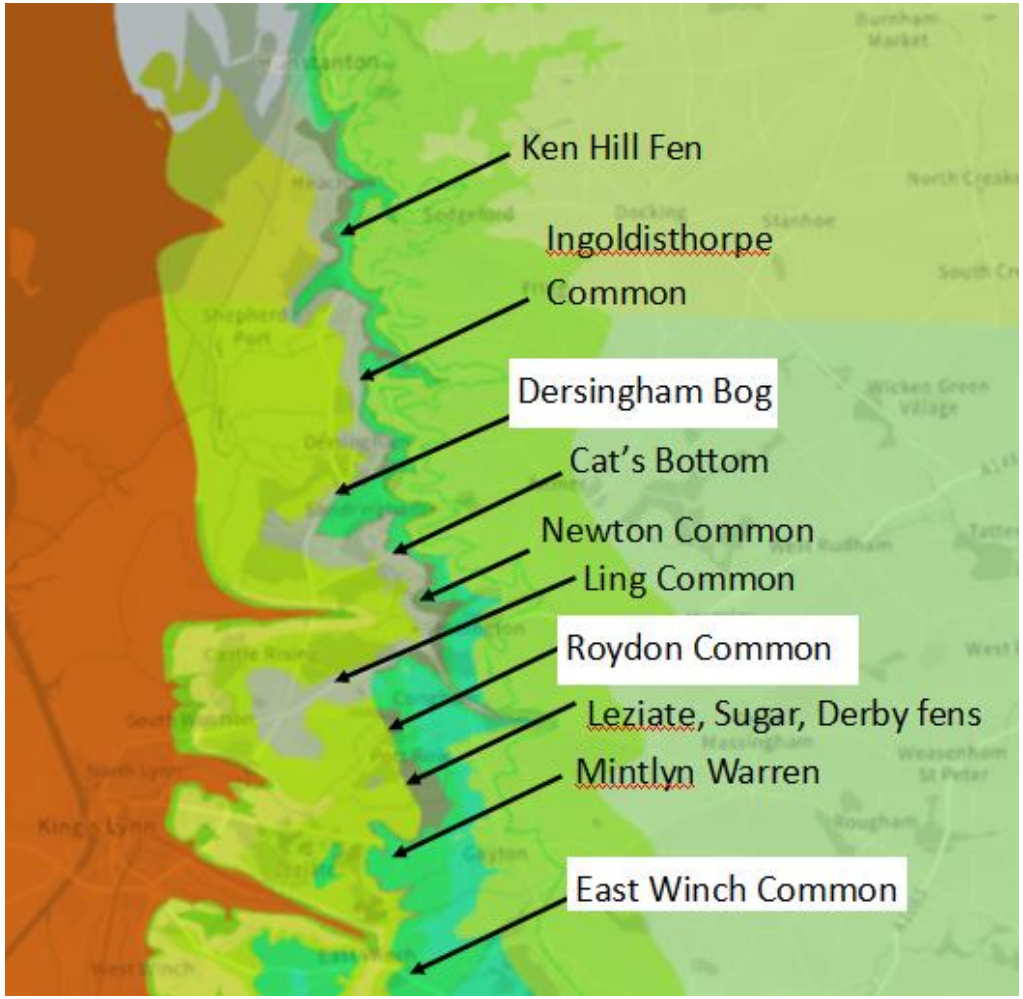
West Norfolk's ancient heath and wetland chain

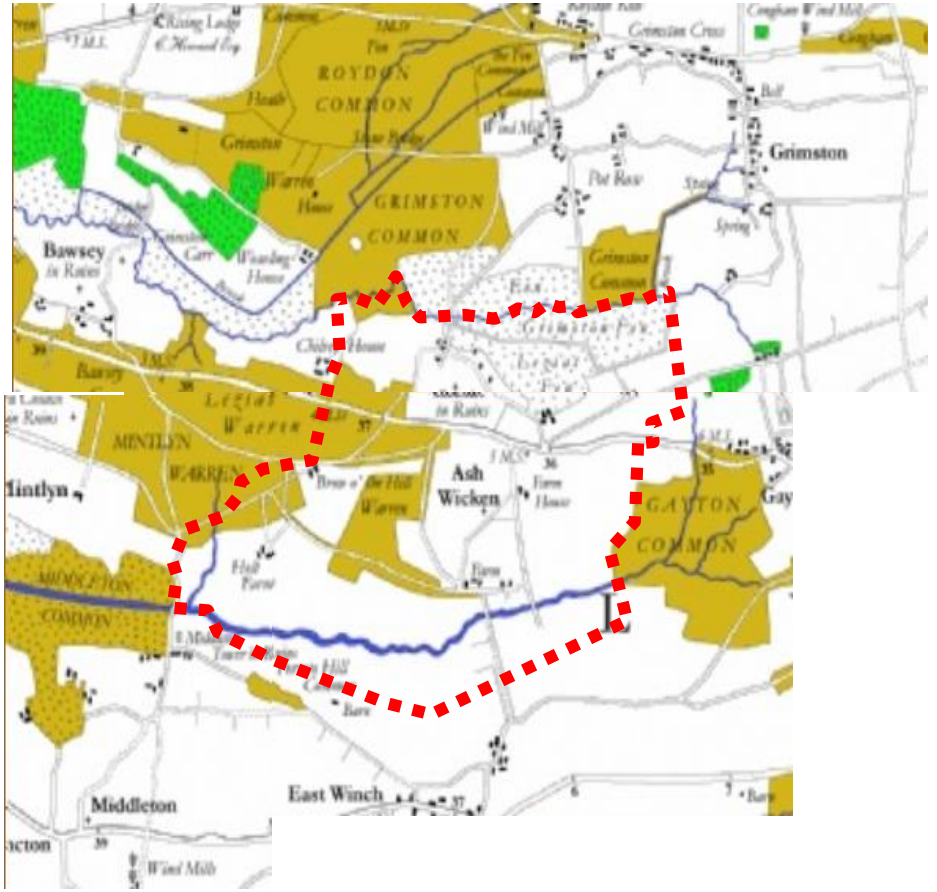
- Groundwater discharging from base of Greensand Ridge created a chain of wetlands
- Probably mostly still in reasonable condition in late 1800s
- Dramatic reduction and degradation in 1900s with few still functional
- But…potential to restore!



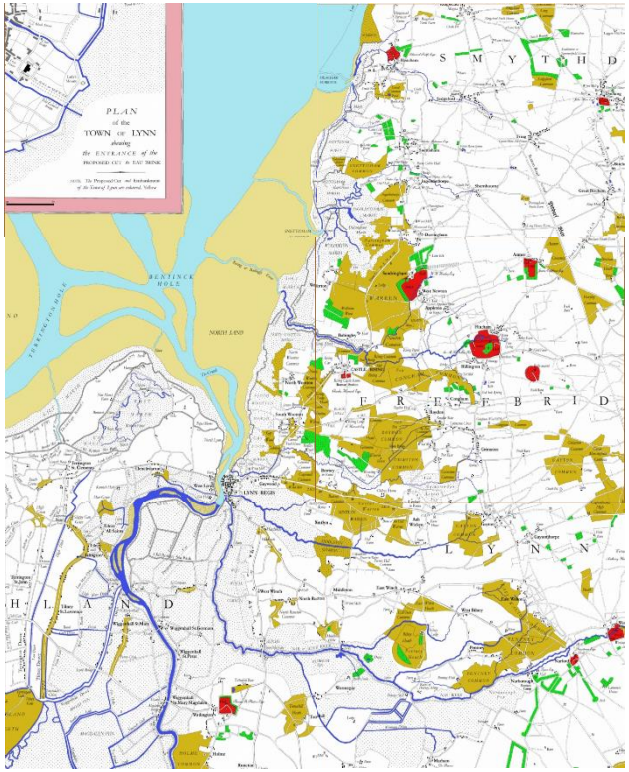
Adapted from www.geologyviewer.bgs.ac.uk

Effect of geology on past land use – Common land

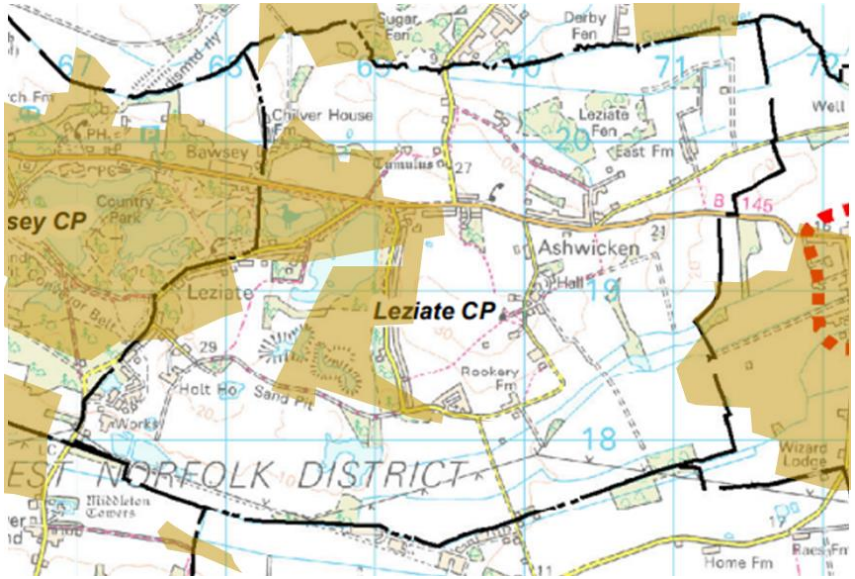
- Common land – generally the poorest, least productive soils
- Faden's map (1797) – commons follow Greensand outcrop
- Geology and landforms also influence placement/development of settlements
- Note how prominent the river is heading out of the Gayton springs



Greensand ridge commons



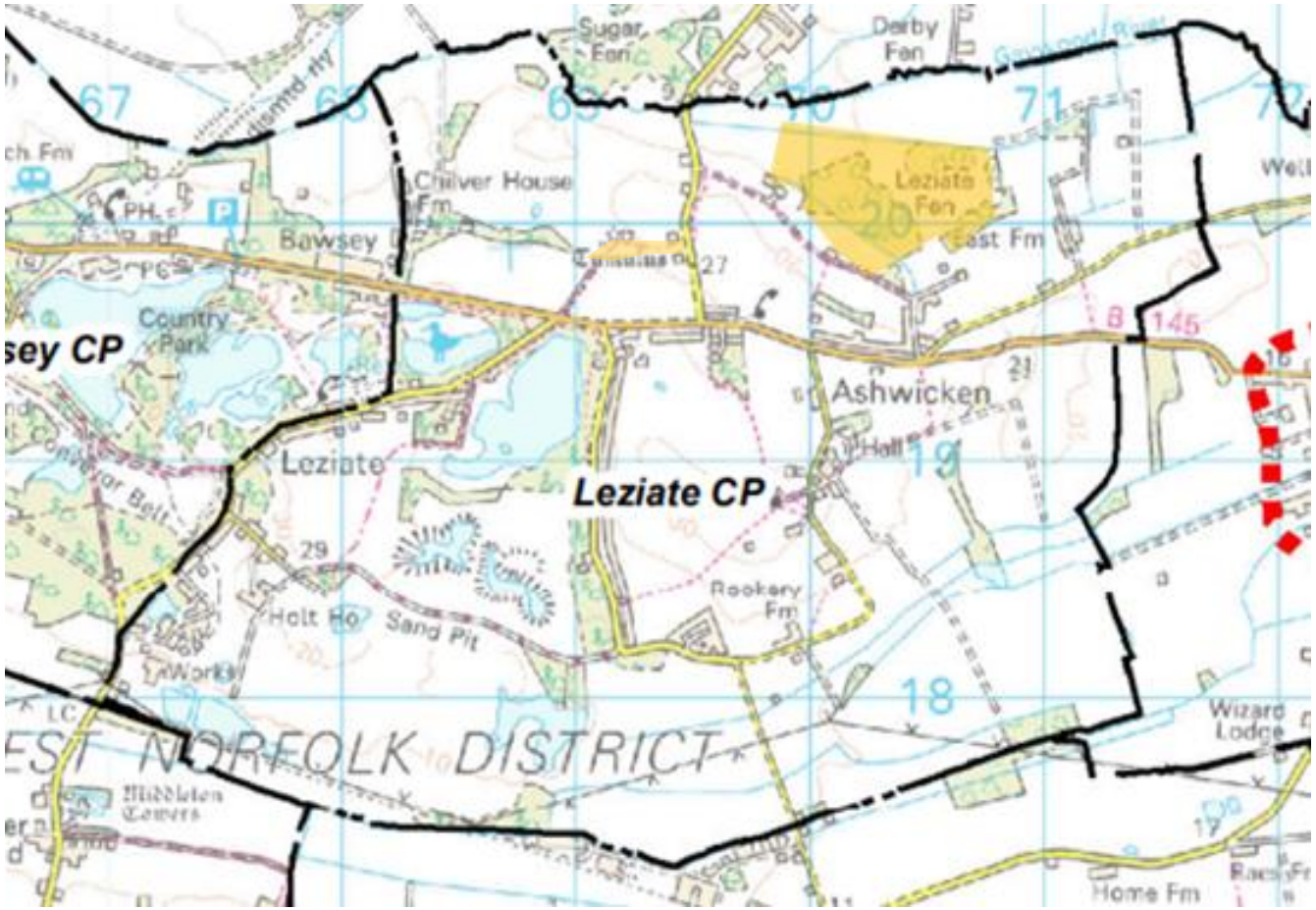
Common land change over time



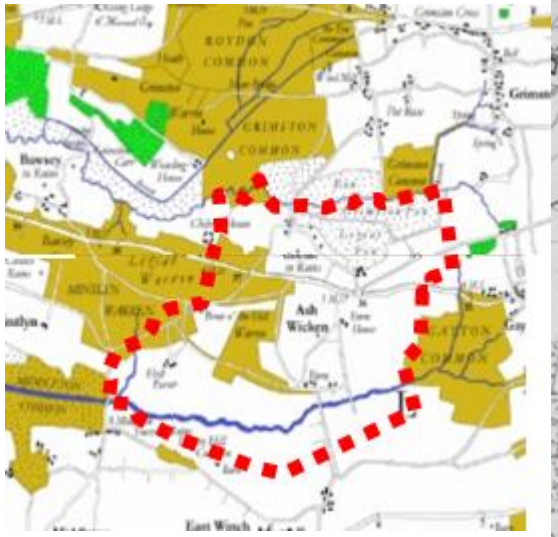
Faden's map (1797)

The present

Common land in present day



Habitat/landuse change 1797 – 1880s



Little gross change up until the late 1800s

Habitat change 1880 - 1947

1947 - Northern boundary of parish (Leziate Fen)

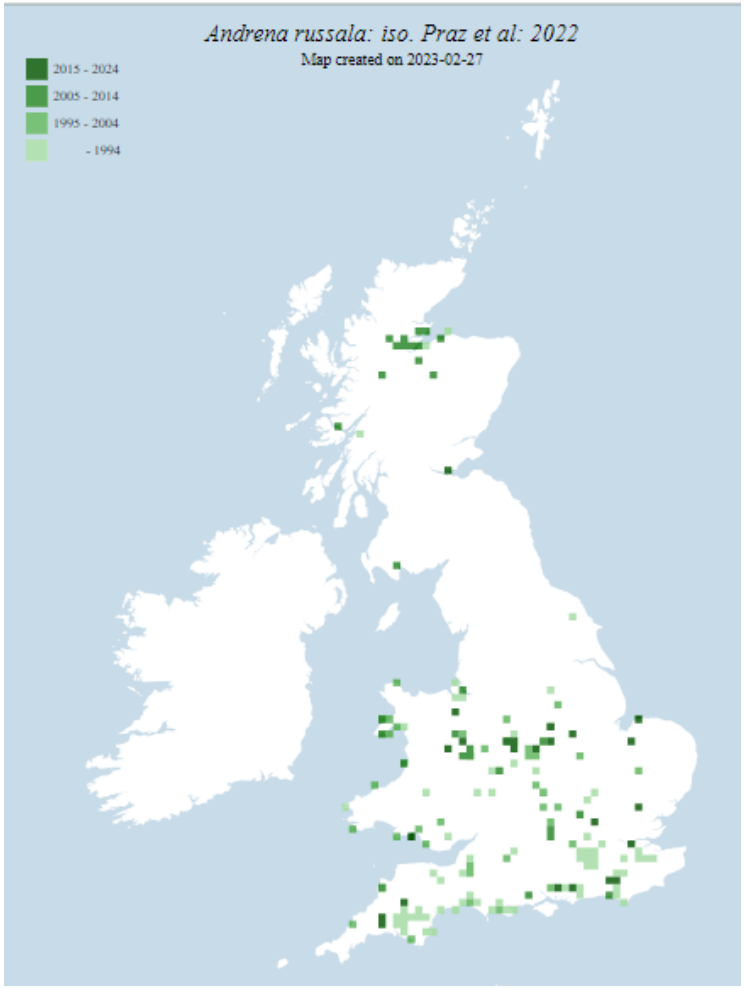
Habitat change 1947 - present

- Drainage of fens
- Neglect
- Quarrying
- Atmospheric pollution and climate change

Marsh Clubmoss *Lycopodiella inundata*

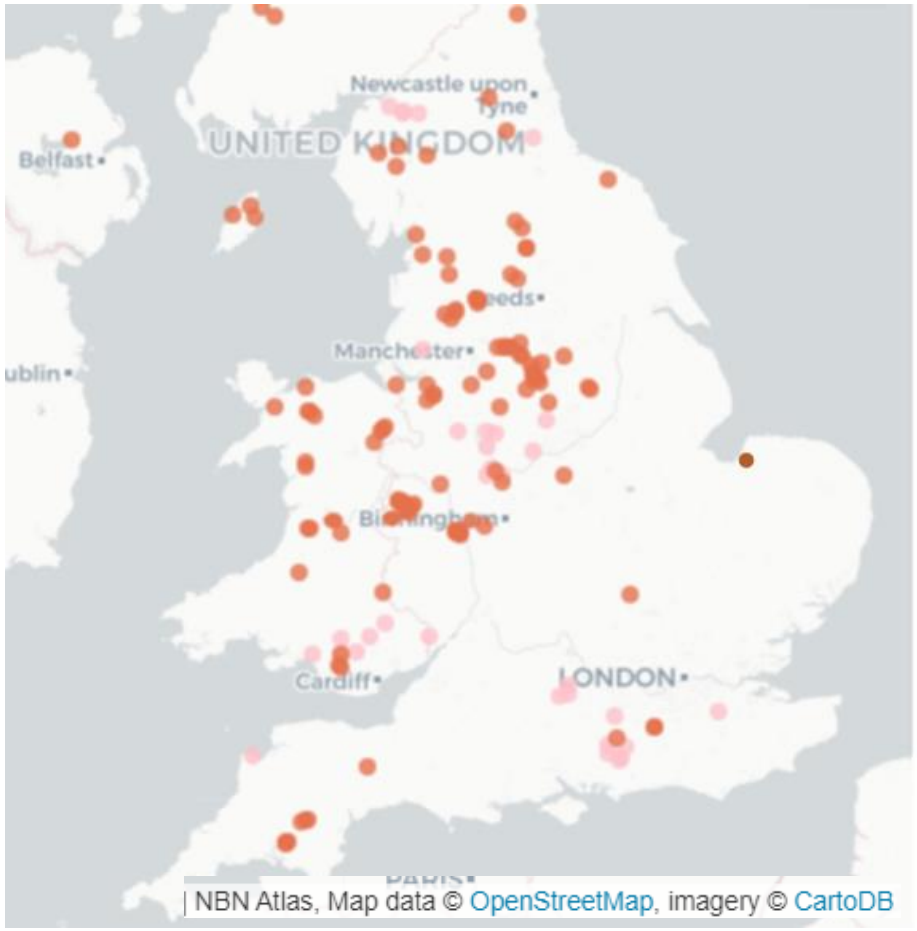
An Endangered species which is rapidly heading towards local extinction in lowland England

Red-backed Mining Bee *Andrena russala*

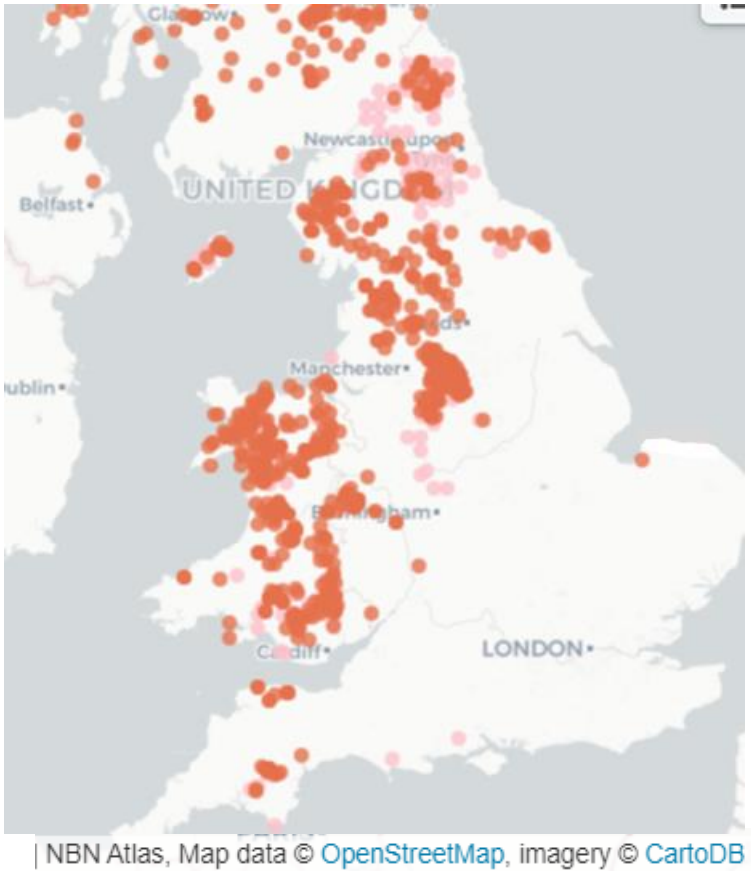


Just two sites in Norfolk, based on two specimens I caught at Bawsey and one from Courtyard Farm, Ringstead.

Post-glacial relict species - Bilberry Mining Bee
Andrena lapponica



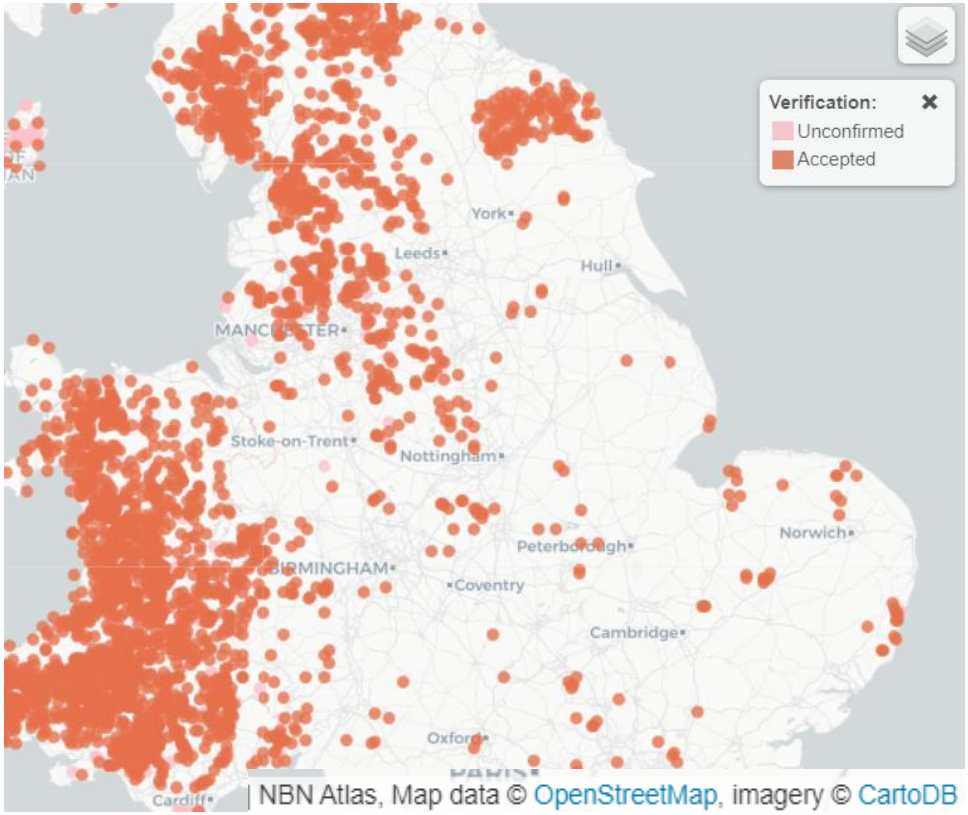
Post-glacial relict species – Bilberry bumblebee *Bombus monticola*



Post-glacial relict species – Slender-horned Horsefly *Hybomitra montana*

Sourced from www.nbnatlas.org.uk

Post-glacial relict species - Little Shaggy Moss
Rhytidiadelphus loreus

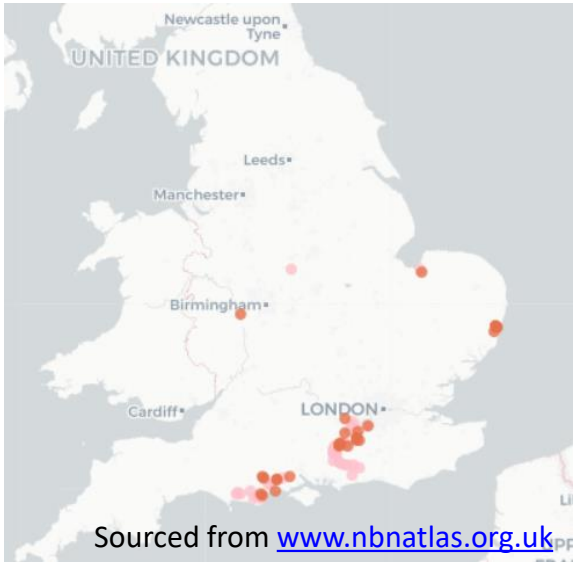


Sourced from www.nbnatlas.org.uk

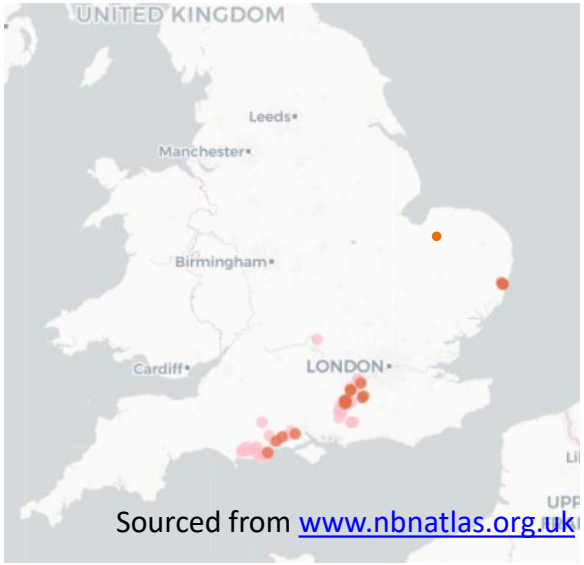
Exceedingly rare wetland species – Dark Club
Clavaria greletii

Sourced from www.nbnatlas.org.uk

Very restricted UK distributions – Small sandpit mining bee *Andrena argentata* & parasite Bear-clawed nomad bee *Nomada baccata*



Small sandpit mining bee



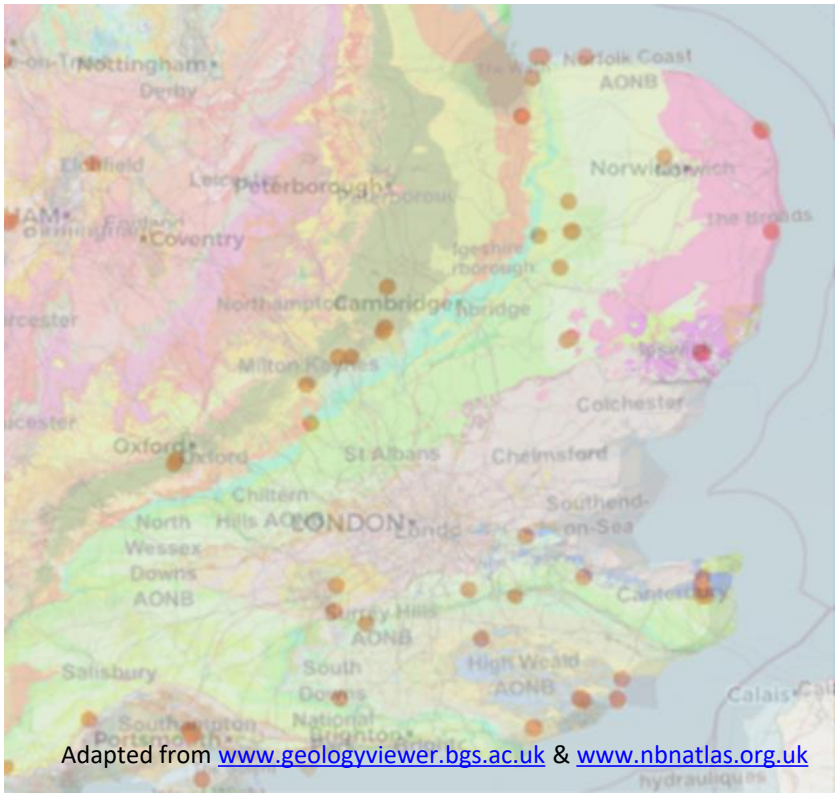
Bear-clawed nomad bee

Regionally scarce heathland species

Broad-bordered Bee-hawk Moth

Maiden's Blush

Bare ground specialists



Adapted from www.geologyviewer.bgs.ac.uk & www.nbnatlas.org.uk

Early Colletes Bee – a recent colonist responding to climate change.

Adapting to climate change requires a network of connected sites for species to enable species to shift through the countryside

Atmospheric pollution – acidification and nitrogen compounds

- N compounds originating from factories and agriculture are transported in atmosphere and fall as rainfall.
- Inputs far exceed tolerance thresholds for semi-natural habitats.
- This results in the spread of nitrophiles at the expense of less competitive species.

Peatland restoration techniques - Tussock stripping

Atmospheric nutrient enrichment results in grass-dominated monocultures

Tussock stripping removes nutrient accumulation

Recolonisation of stripped area by a wealth of mire specialists

Restoring habitats and species

- The 'West Norfolk Nature Network' and 'North-West Norfolk Coast' projects been awarded funding through the second round of the Landscape Recovery scheme

- Defra Peatland Recovery project (Leziate Fen)
- Direct management – RSPB, NWT
- Higher Level Stewardship schemes

- Influencing key local landowners

Thank you!

Any questions

Leziate Parish Solid Geology

Leziate Parish Superficial Geology

Peatland restoration techniques – Peat pool creation

Peatland restoration techniques – mire mowing

Mire & Fen Restoration results