



Big targets, big ambitions: unpicking the pros and cons of woodland expansion in Scotland



**Ruth Mitchell and
Alison Hester**



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Increased tree planting will benefit the environment and the economy



PM promises to treble the rate of tree-planting in the UK, with up to 30million more planted every year



Press release

Government launches new scheme to boost tree-planting

NEWS

Climate change: Tree planting rise 'needs to happen quickly'

News story

Thousands of trees to be planted in England's towns and cities

Government to support tree-planting schemes through £10m Urban Tree Challenge Fund.

Environment

UK needs to plant 1.5 billion trees to tackle climate change, government told

'Let's not shy away from the truth. It will be a challenge, it will cost money'

Phoebe Weston Science Correspondent | @phoebe0 | Tuesday 30 July 2019 15:04 | 32 comments

Replanting Britain: 'It's about the right tree in the right place'

...than £1 per person a year is spent on planting English trees, mistakes loom large
...our appeal [here](#)

Woodland Trust to plant 50 million trees over 5 years to fight climate crisis



Flood mitigation



Biodiversity



Recreation

Why plant trees?



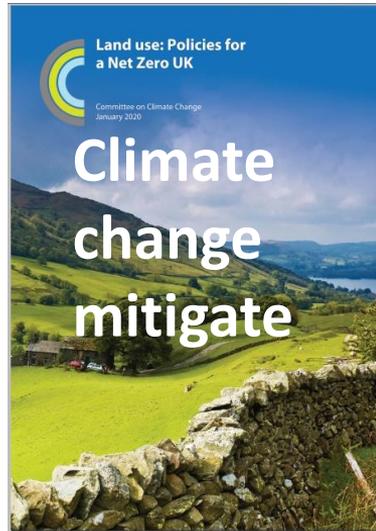
Aesthetics



Timber



Food and foraging



Climate change mitigate



Scot Ramsey

Talk structure

- Long term experimental results
- 5 min break
- Scaling up



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This project receives funding under the Forestry Grant Scheme.



The Forestry Grant Scheme

Scotland's woodlands and forests are a vital national resource and play an important role in rural development and sustainable land use. As well as helping to reduce the impacts of climate change and providing timber for industry, our forests enhance and protect the environment and provide opportunities for public enjoyment.

The Forestry Grant Scheme funding is supported by the European Union, is supporting the sustainable management of existing woodlands and the creation of new woodlands – contributing towards the Scottish Government's published targets for woodland creation.

Forster Woodland Creation

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The European Agricultural Fund for Rural Development:
Europe investing in rural areas



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Tree planting and climate change mitigation



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Tree biomass
= stored
carbon



Less carbon
dioxide in
the
atmosphere



Reduces
climate
change

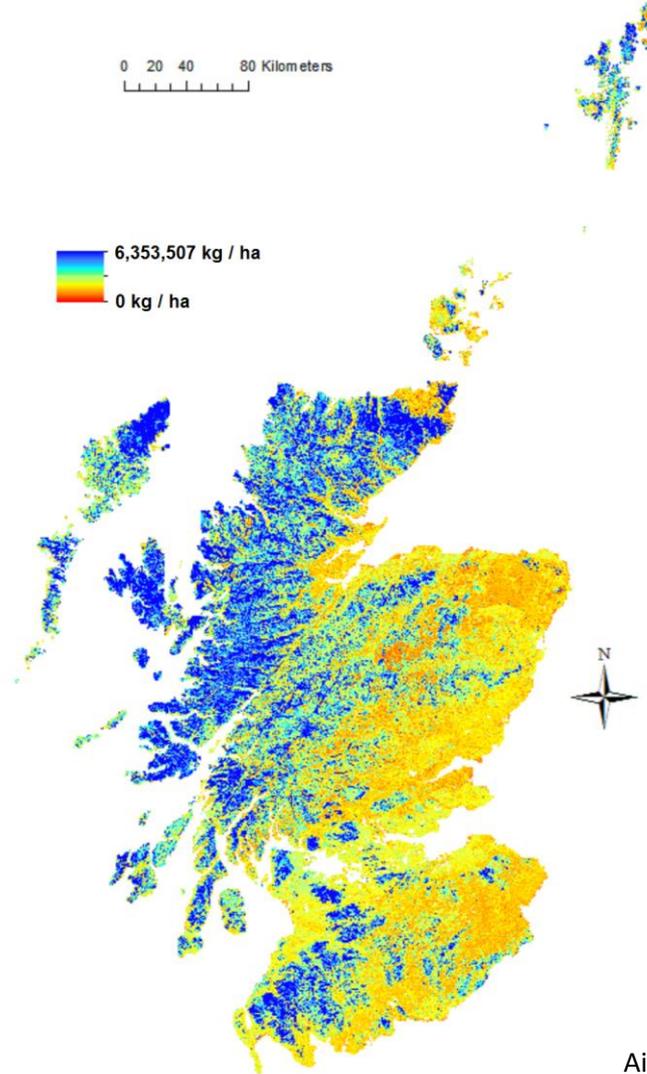
Is this always true?



Soil carbon

Carbon stored in:

- Above ground vegetation
 - Soil
-
- Need to look at both



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Miles planted plots



Heather control plots

Birch plots



- ❖ Established early 1980's
- ❖ 3 sites
- ❖ Each site 6 plots planted birch and 6 open moorland

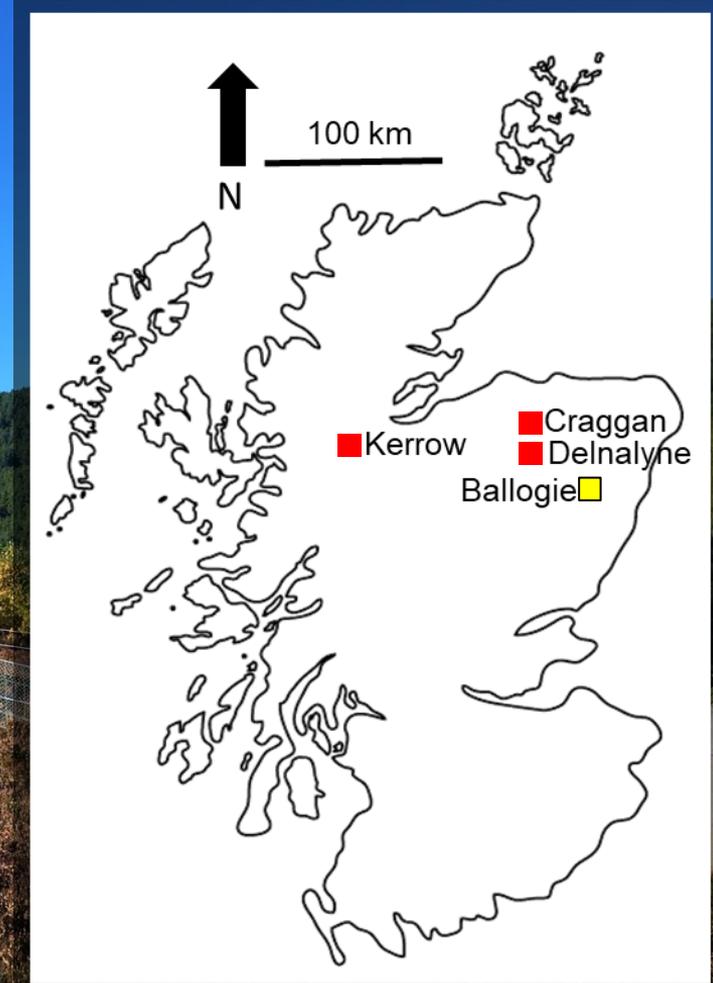
2005 new experiment

➤ Species effect – birch and pine



Test the assumption Planting trees = increased carbon storage

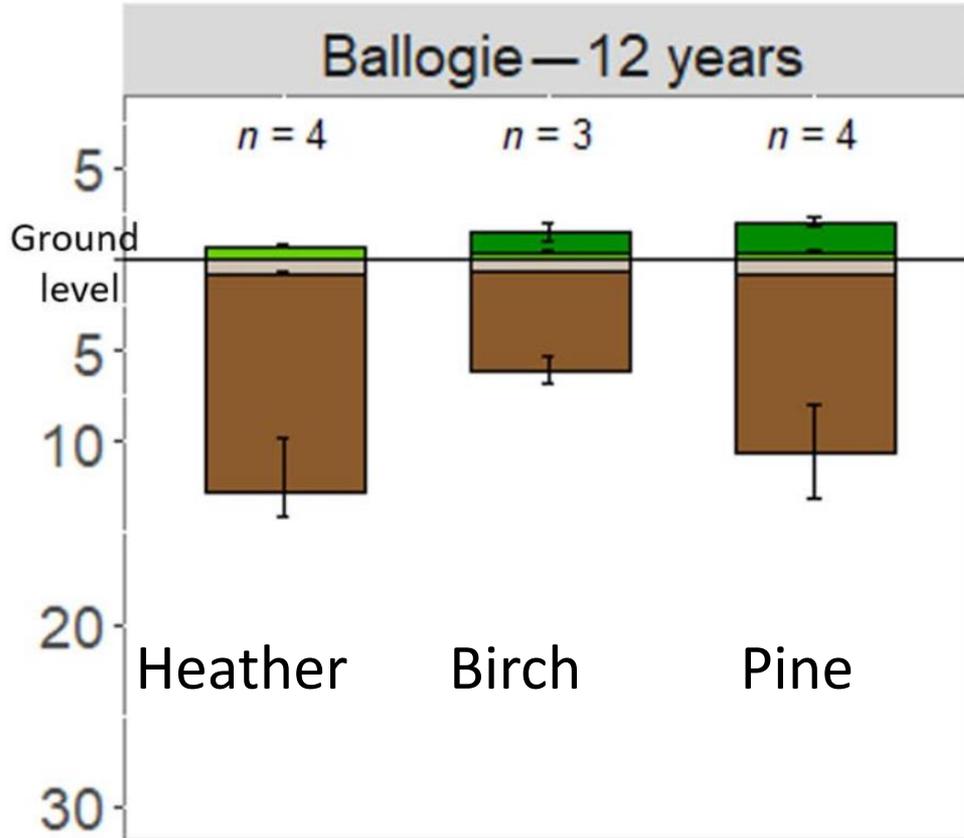
- Birch and Pine 12 years old
- Birch trees 39 years old



Results – impacts on carbon storage



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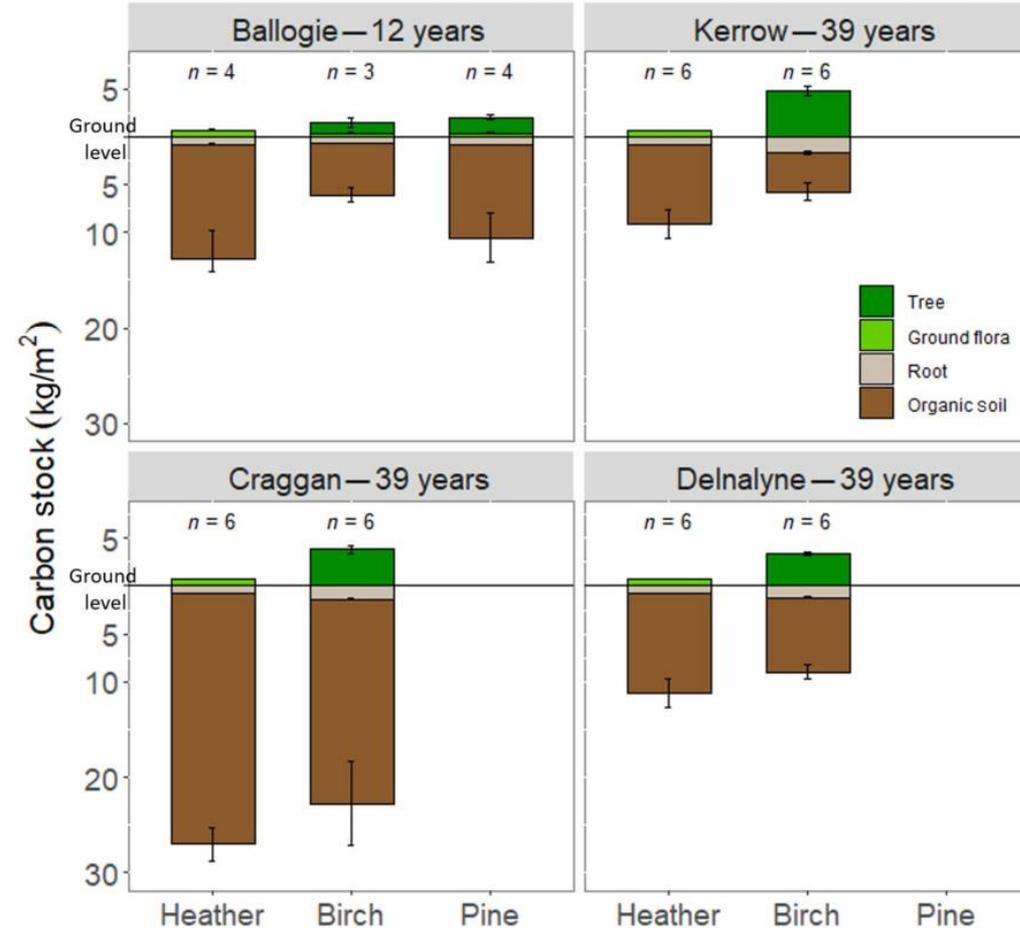


Friggens et al. 2020

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Results – impacts on carbon storage



- Above ground – increase in carbon
- Below ground – losses of carbon
- Overall no net gain in carbon

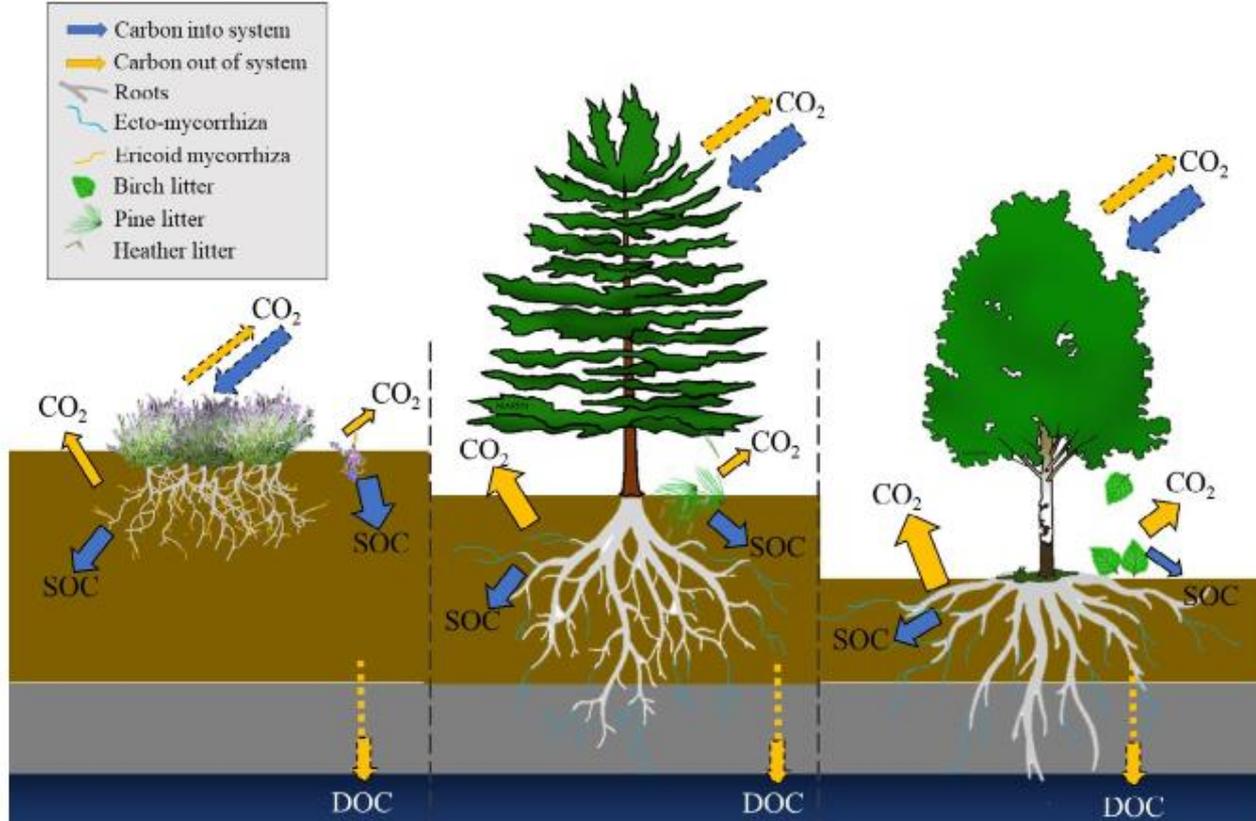
Summary

- Below ground impacts of trees very important
- On decadal timescales, trees were not mitigating climate change

Where did all that carbon go?



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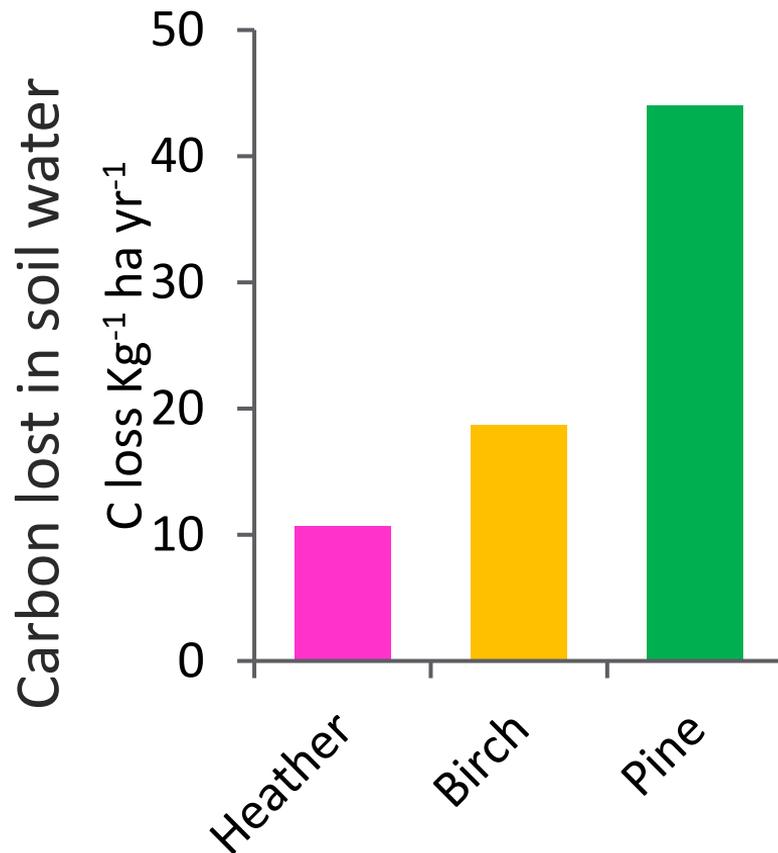


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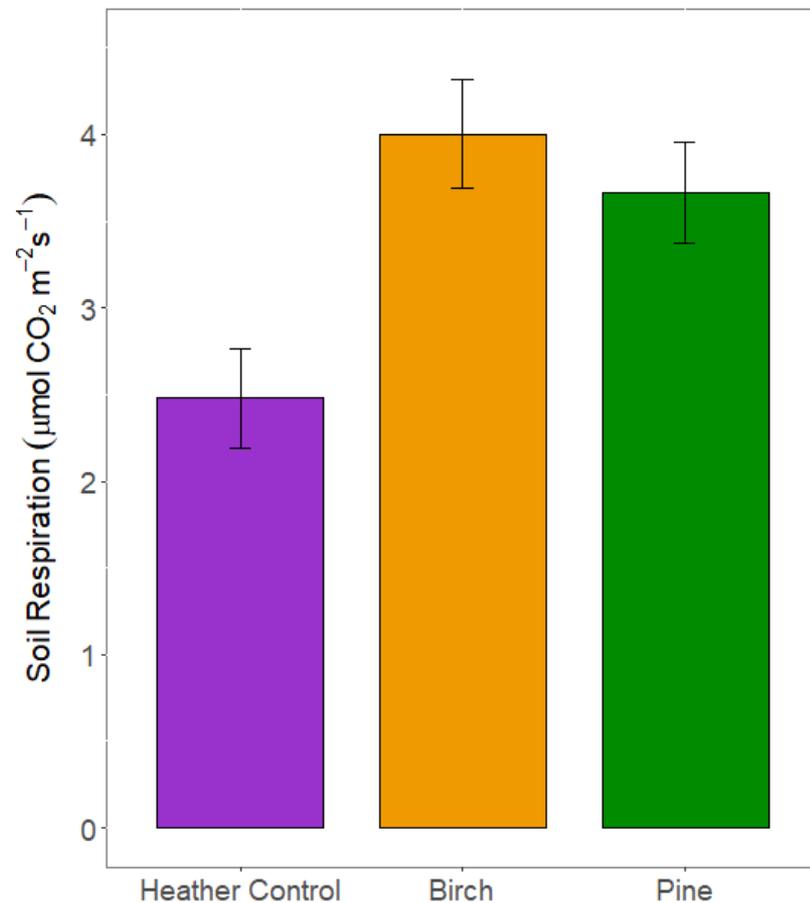
Where did all that carbon go?



Where did all that carbon go?



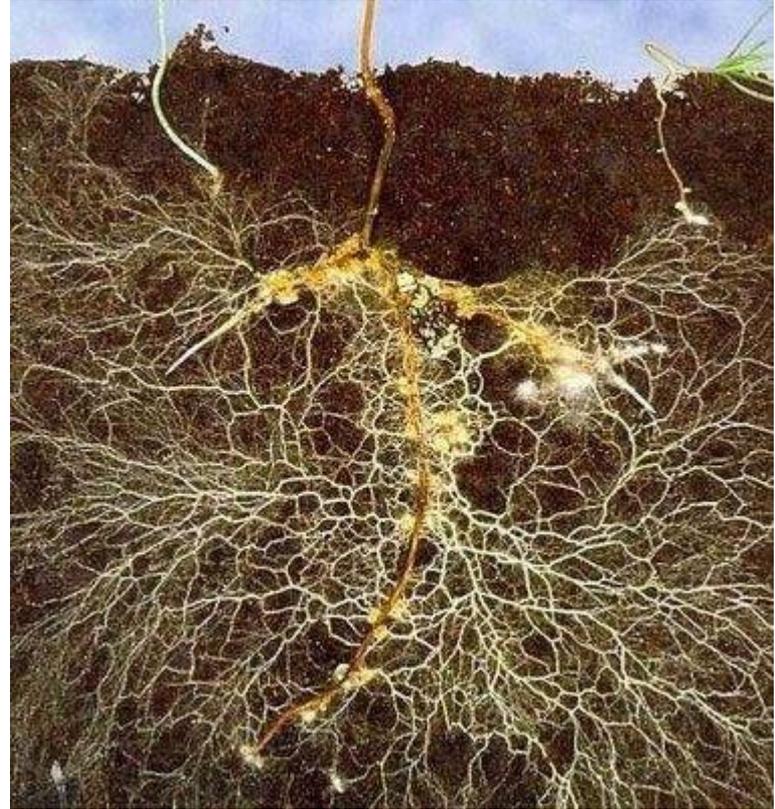
Increase in soil respiration
The soil community is changing



Changes in the fungi in the soil



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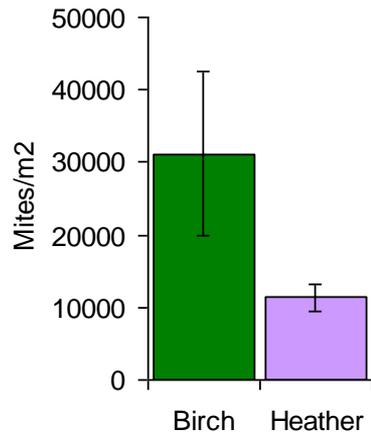
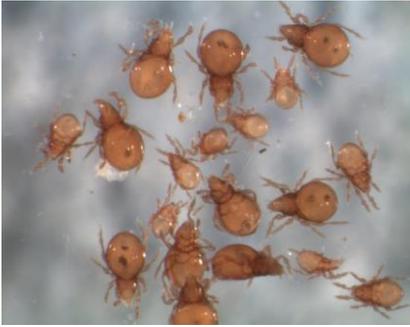


Other impacts on soil communities

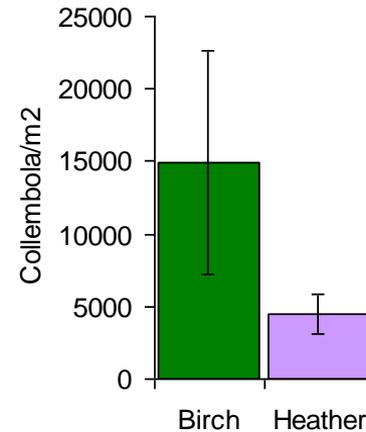


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Mites



Springtails

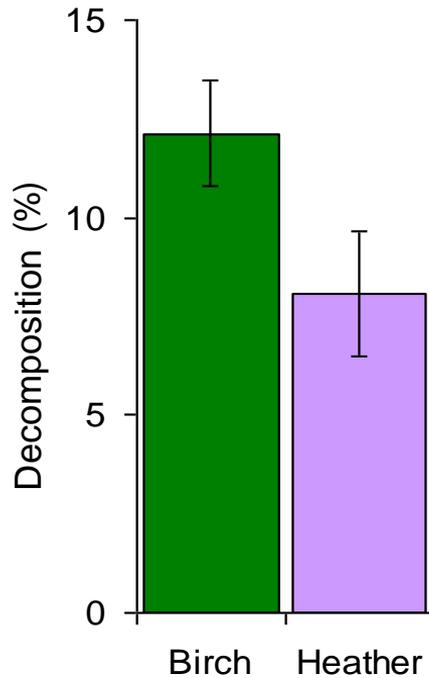


Consequences for nutrient cycling rates

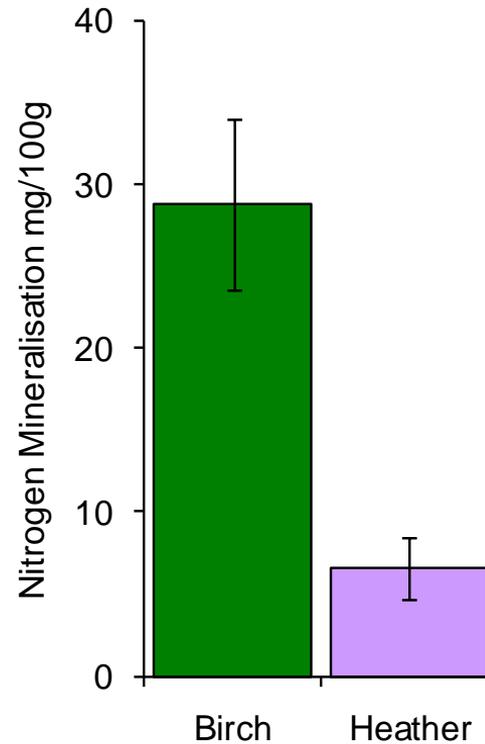


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Decomposition



Nitrogen mineralisation



Above ground changes



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Vegetation

- Loss of heather
- Mosses (grasses and blaeberry)

Trees and Ticks



Public Health
England

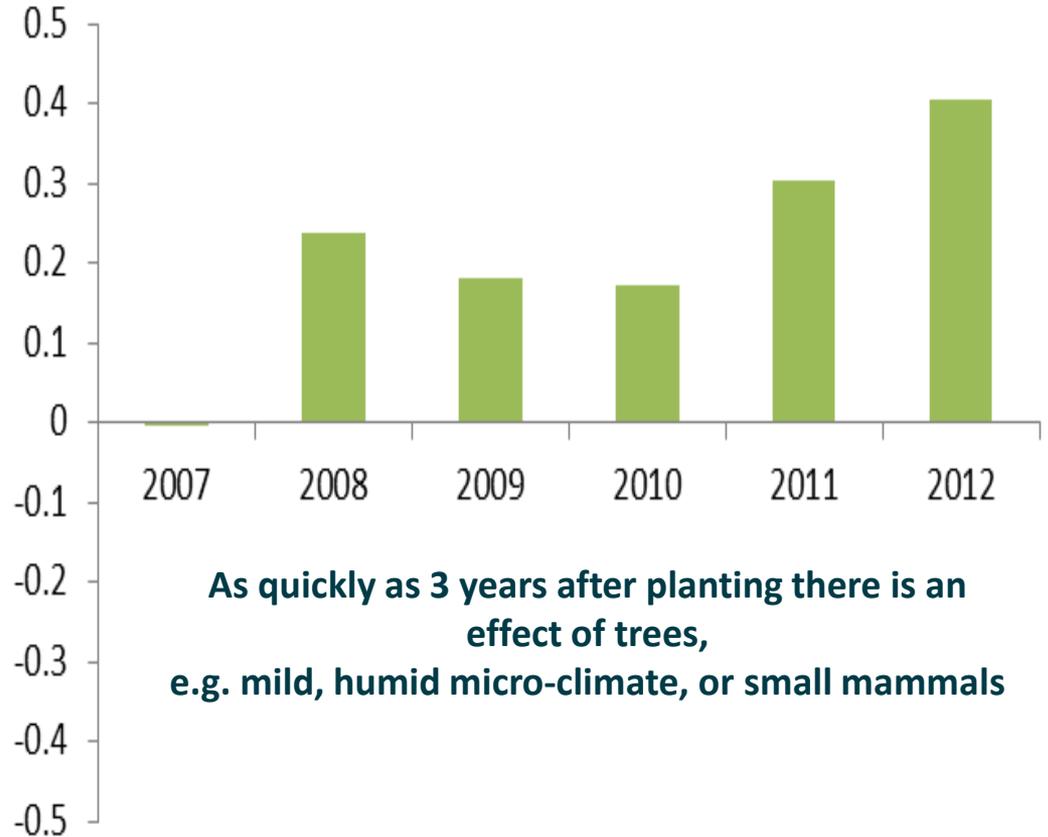
Protecting and improving the nation's health

Lyme Disease: Signs and Symptoms

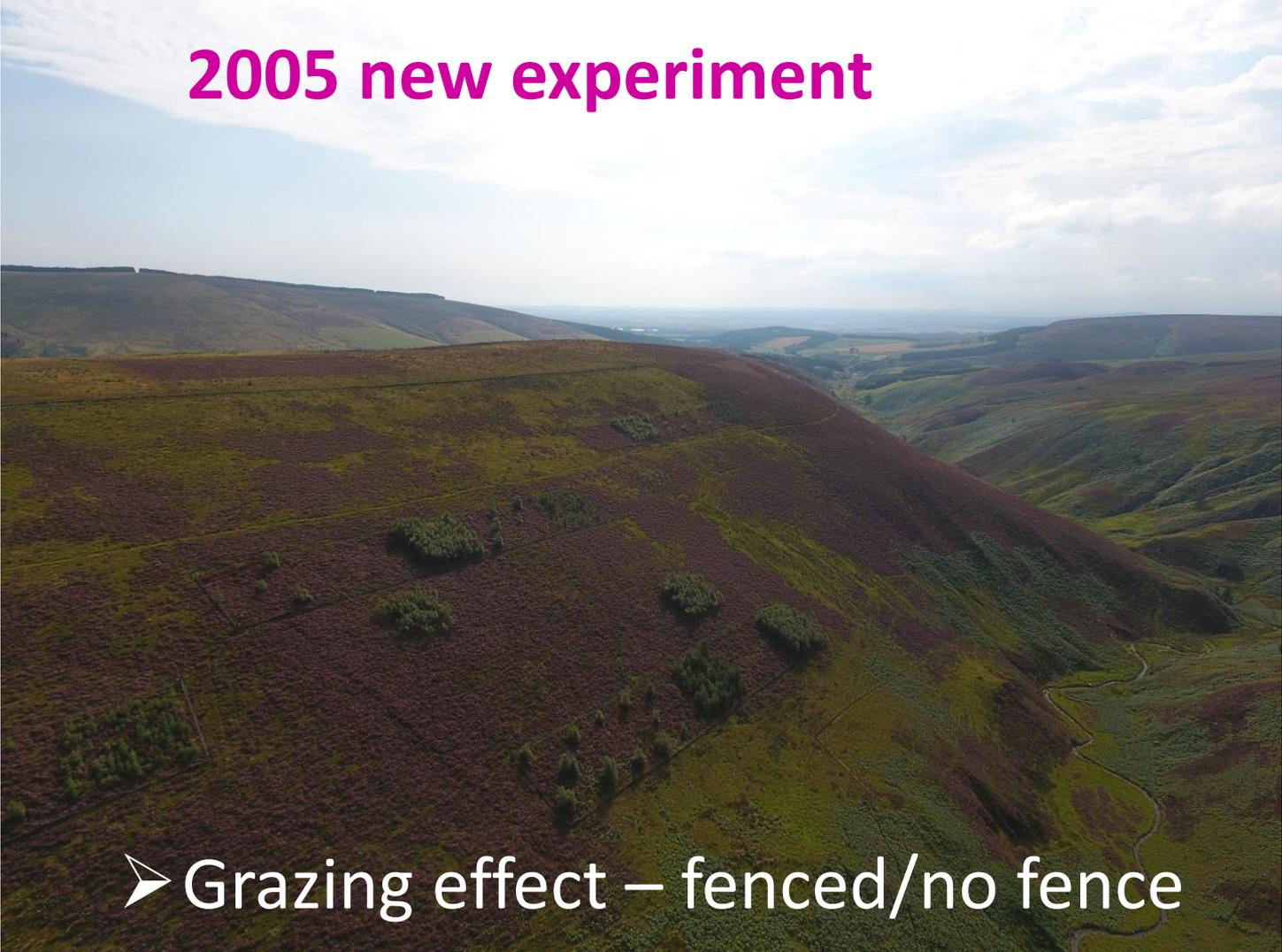
What is Lyme disease?



Proportional difference in ticks
between heather and birch



2005 new experiment



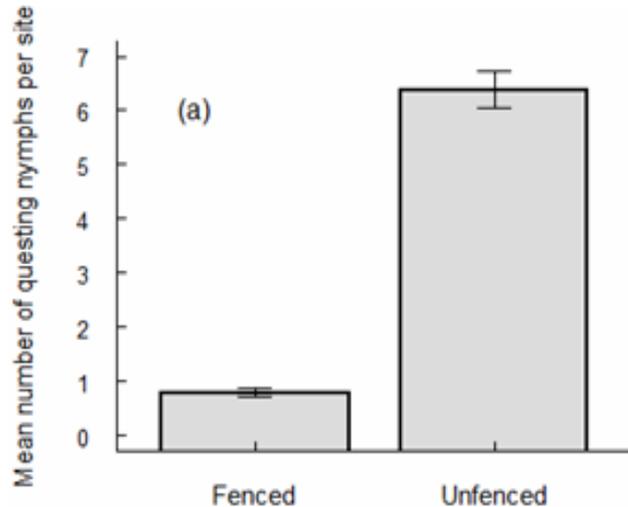
➤ Grazing effect – fenced/no fence

An effective way to control ticks can therefore be through deer management

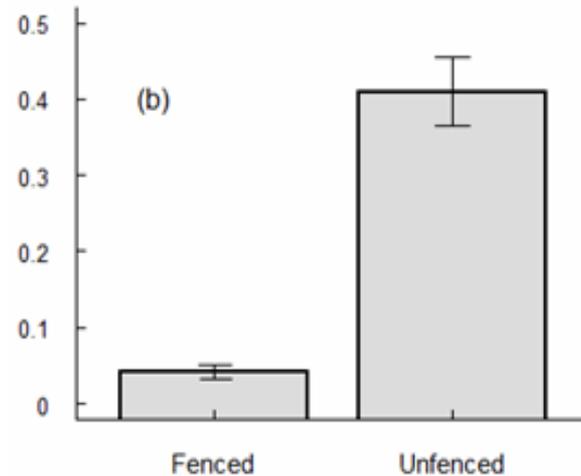


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Moorland - deer farm
V high deer density



Moorland – sporting estates
“typical” deer density



Only experiments, what about the rest of Scotland?

Our sites typical of many potential tree planting sites in Scotland
(heather moorlands with organic rich soils but not peat)

Relevance to policy

- Experiment time scales \approx Net zero timescales of 2050
- No net carbon gain for c 25% of potential tree planting area?

However

- Mineral soils likely to lead to net gain
- Differences between tree species
- Ground disturbance when planting increase soil carbon losses



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Challenges the assumption held in many policy circles that tree planting will always mitigate climate change



Flood mitigation



Biodiversity



Recreation

Benefits/disbenefits – Trade offs



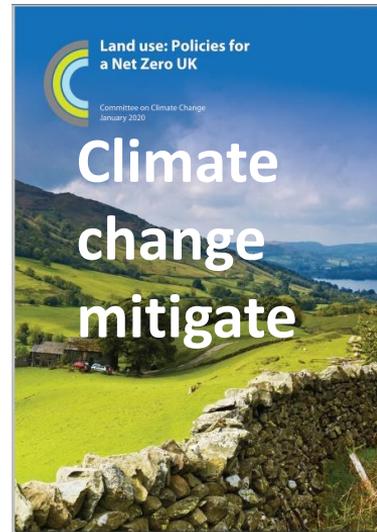
Aesthetics



Timber



Food and foraging



Land use: Policies for a Net Zero UK
Committee on Climate Change
January 2020

Climate change mitigate

Thank you to you for listening and...



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And many other

The Funders

- Nature Conservancy
- ITE/CEH/NERC
- British Ecological Society
- Strategic Research Programmes of the Scottish Government.

The Landowners

- Ballogie Estate
- Invercauld Estate
- RSPB
- Crown Estate



Scottish Government
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