Terrestrial plant species richness and NPP

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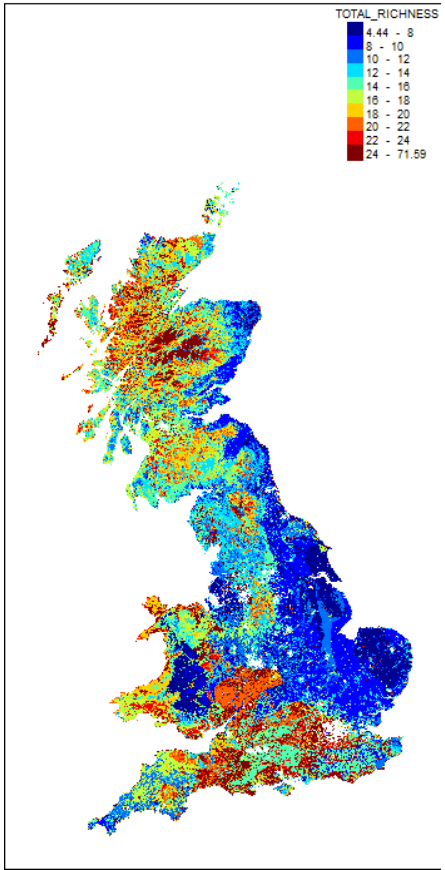

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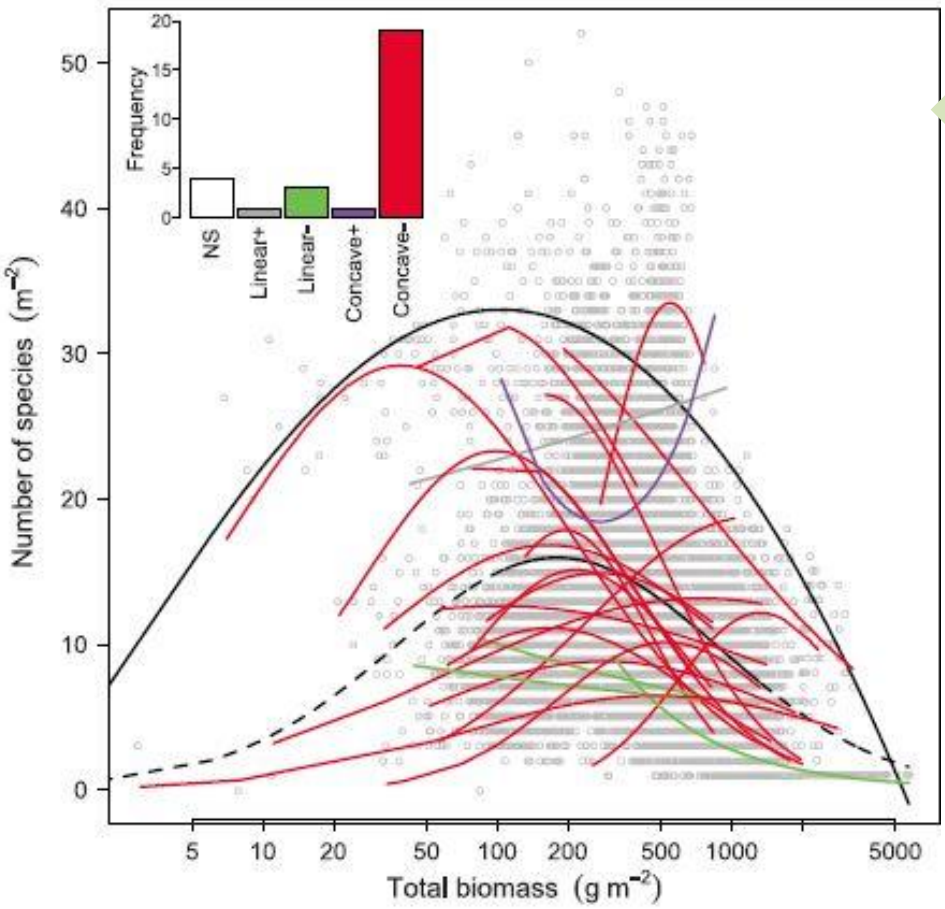
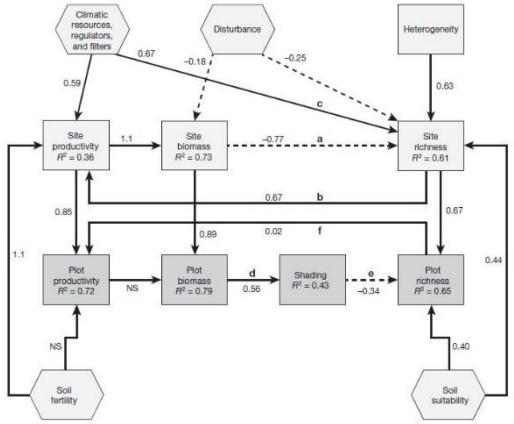
Objective:

- A test of the consistency of modelled changes in NPP with change in observed plant species richness across Britain.
- What would we expect from theory and observation?



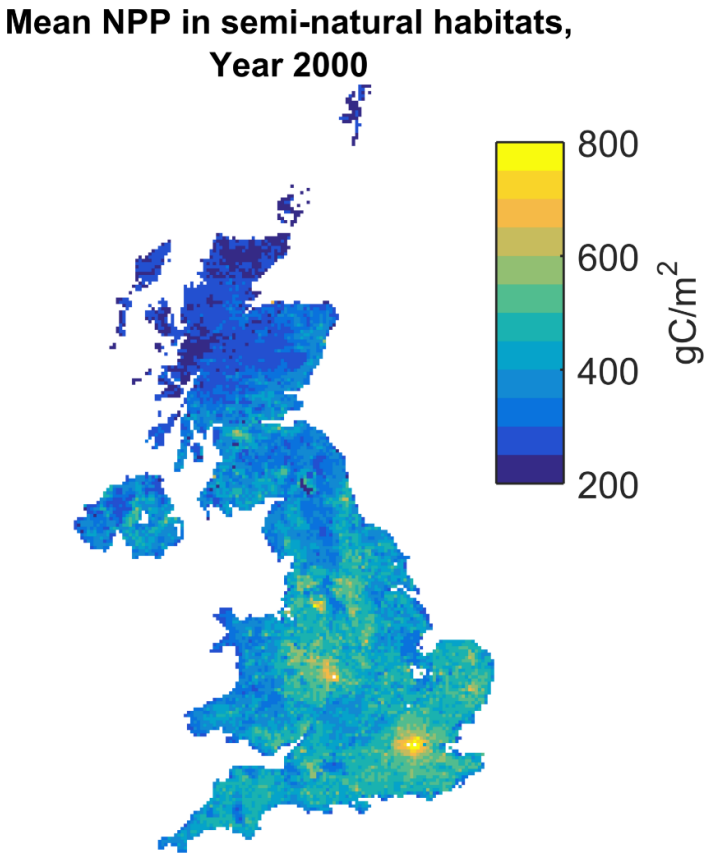
Global analysis: Mainly a hump-shaped pattern (Lauchlan et al 2015 *Science*. **349**, 302-305).

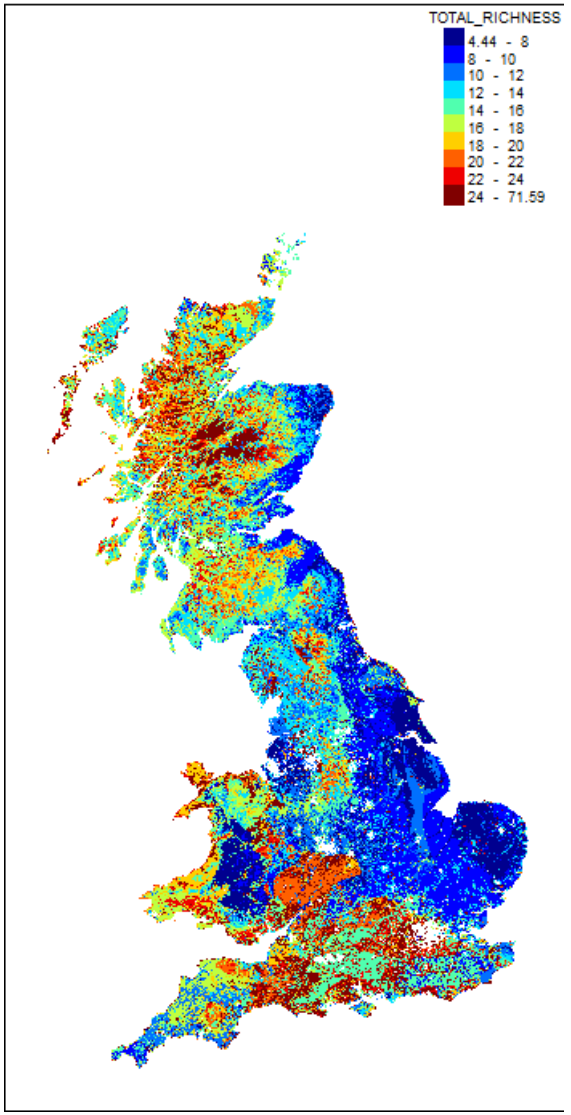
But 'explaining' the variation requires a complex network of factors (Grace et al 2016 *Nature* **529**, 390-393).



Broadly consistent national patterns but with some major discrepancies

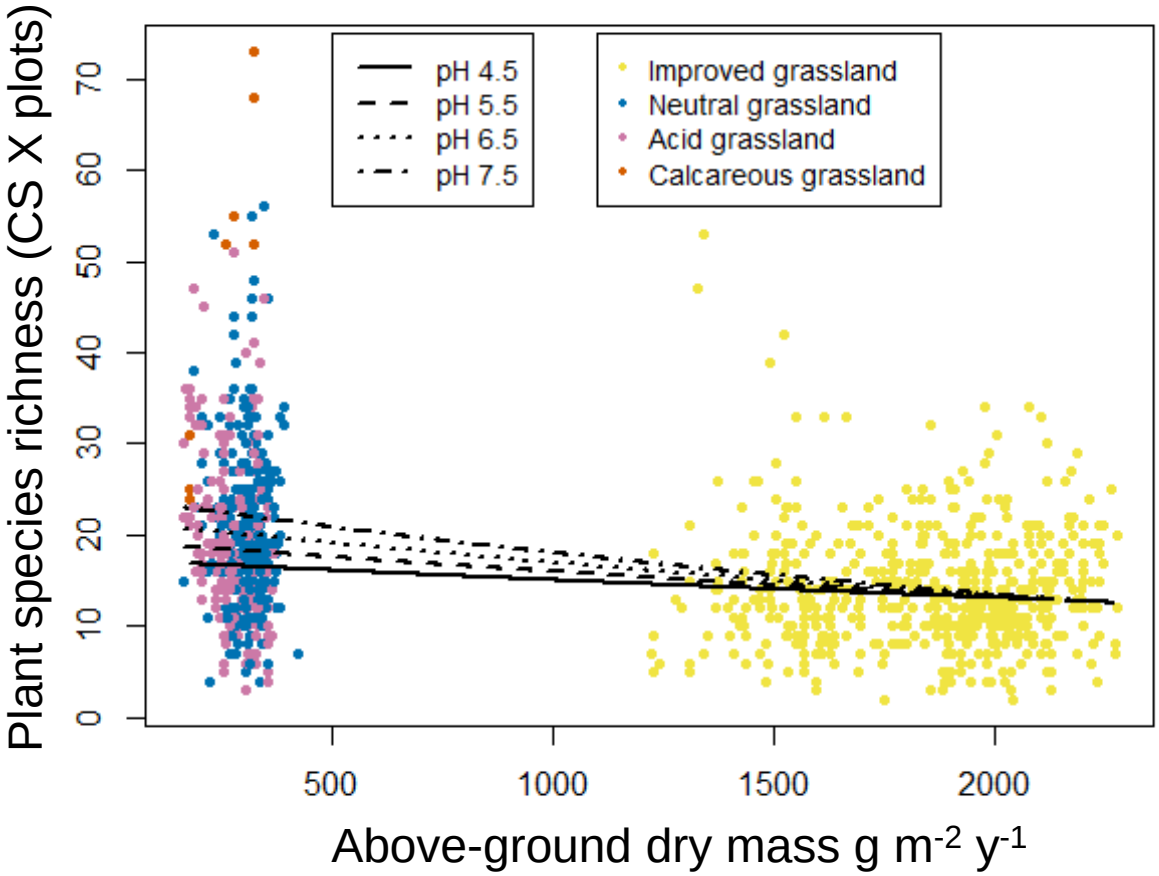
- Highest mean species richness in west and on calcareous substrates.
- Highest productivity in south and east.
- N dep influences NPP around conurbations. Soil pH and many other factors influence species richness.

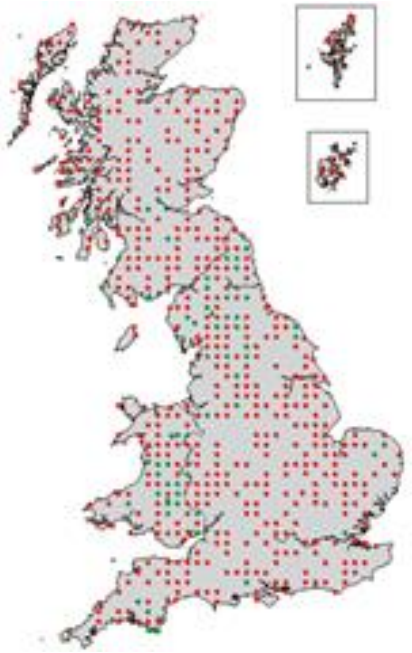




LTLS: NPP versus species richness

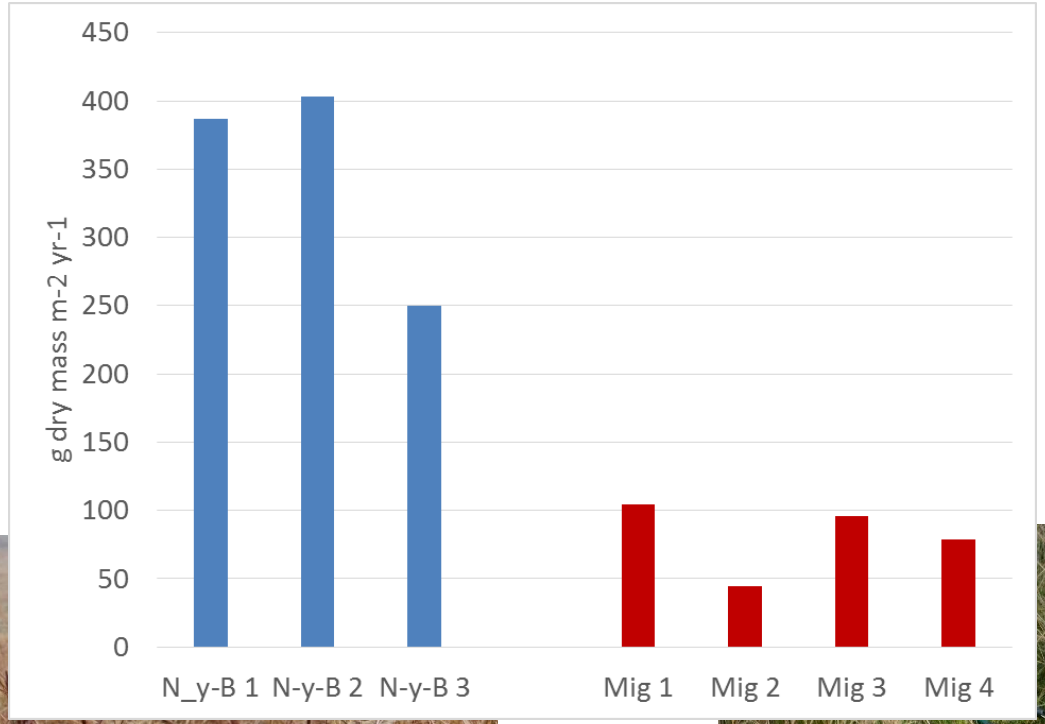
- Soil pH associated with increased species richness but the effect is suppressed as productivity goes up.

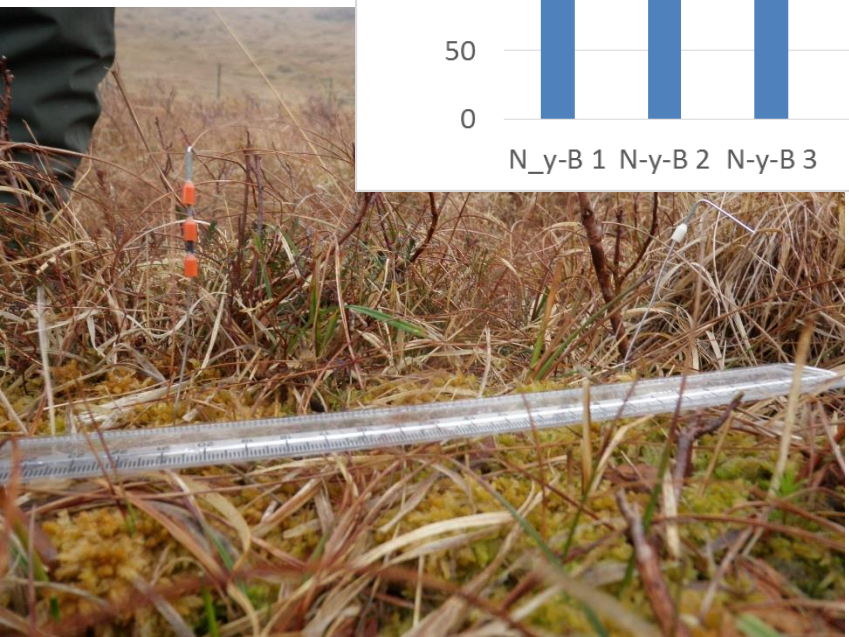


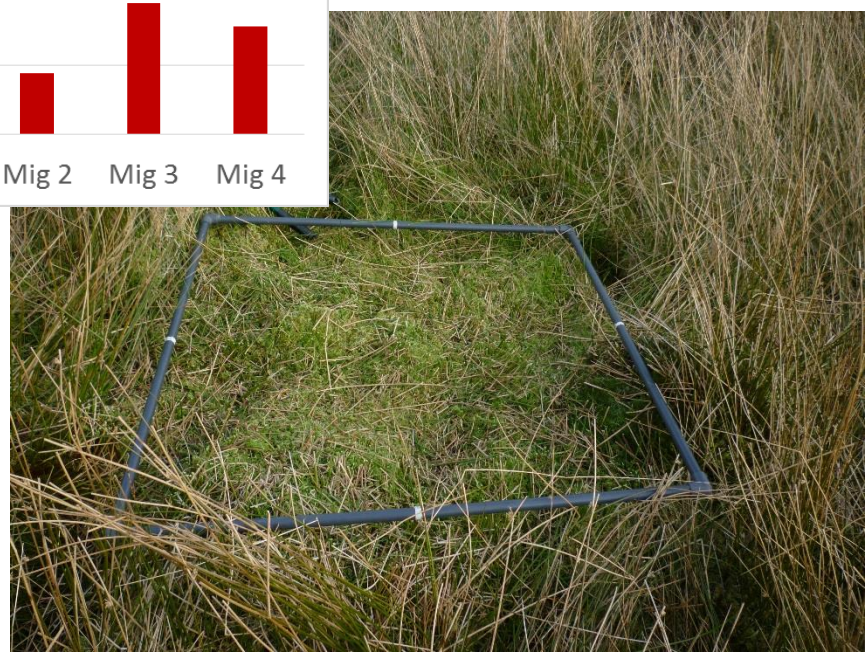


High variation in observed NPP within habitat types

- *Sphagnum fallax* versus *Sphagnum capillifolium* on blanket bog.







Nuisance variation in species-richness

- Climatic influences

"drought favours gap colonists and wetter weather can make bryophytes more apparent"

- Recording effort

"in CS2007 surveyors recorded more species in wetter weather but only in Scotland!!

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Model species not species richness?

Indicators of ecosystem function and quality .. some examples.

- **Nectar plants**
  - Bird's-foot Trefoil, Red Clover, Heather

- **Eutrophication indicators responsive to macro-nutrients**
  - Crowberry, Nettle

- **Carbon sequestration/ Flood regulation**
  - *Sphagnum* spp.

- **Indicators of climate change; those at their range edge or altitudinal limit**
  - For example Marsh Hawksbeard, Dwarf Willow

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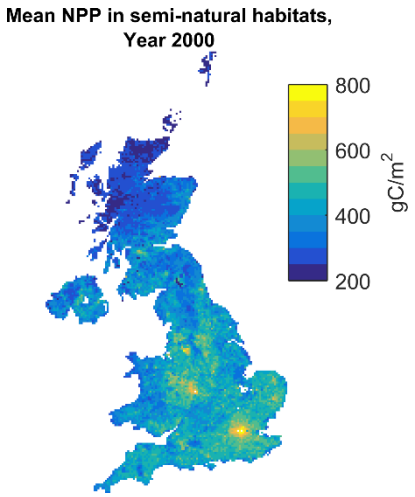
A way forward? Linking N14CP to species niche models.

(see Henrys et al 2015. *New Journal of Botany* 20, 60-79)

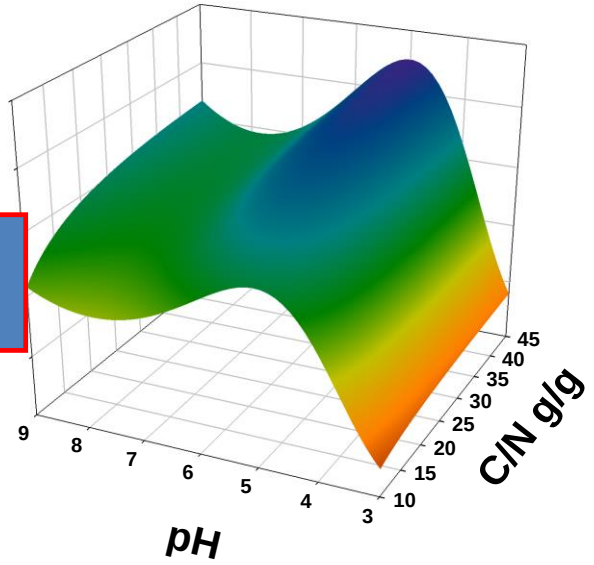
IM / N14CP



NPP, habitat type

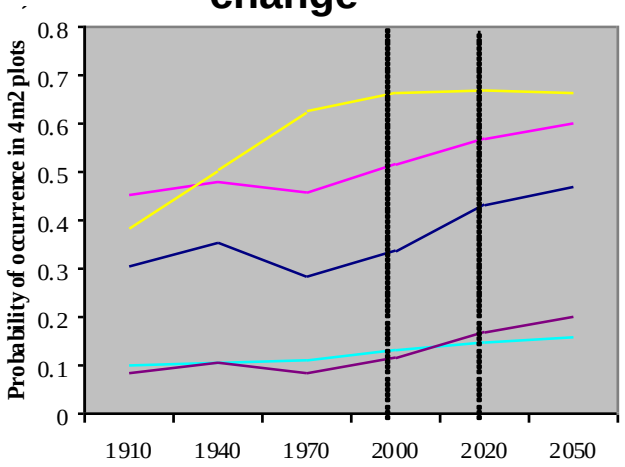
Niche model; MultiMOVE

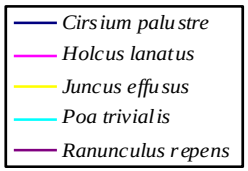
e.g. Round-leaved sundew



Habitat suitability

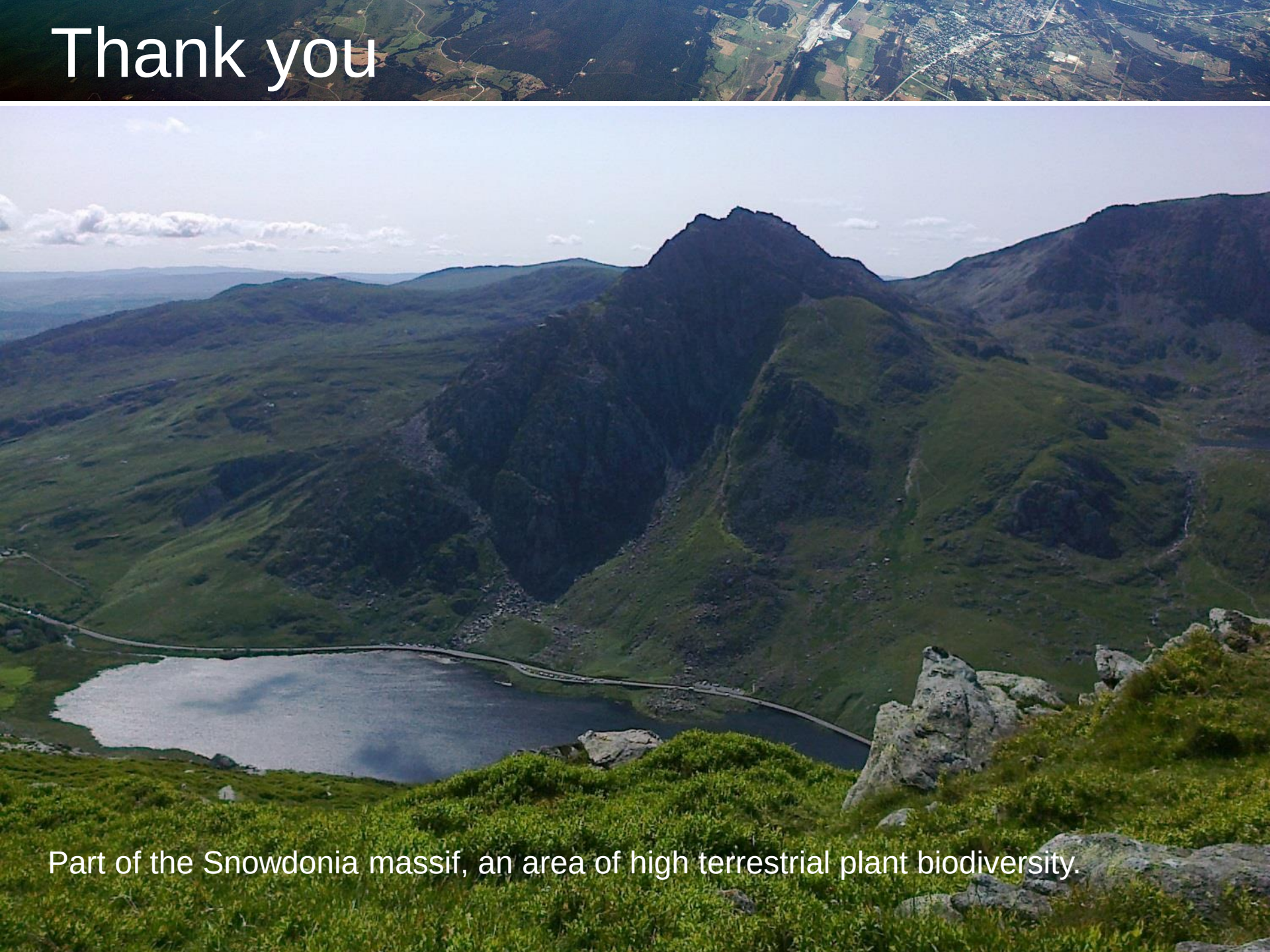
Predicted species change





Implications for biodiversity and ecosystem function

Thank you



Part of the Snowdonia massif, an area of high terrestrial plant biodiversity.

High variation in observed NPP within habitat types. II

- *Rhododendron ponticum* in broad-leaved woodland understorey.