Restored or reinvented?
Assessing the success of peatland restoration pilot projects in Northumberland using environmental DNA (eDNA)

Isis Cohen Nicholson[*1], Rosie Everett[2], Miranda Prendergast-Miller[3], Roseann Black[3], Bronwen Whitney[3], David Pearce[1]
* isis.nicholson@northumbria.ac.uk
1. Department of Applied Sciences, Northumbria University; 2. SRUC; 3. Department of Geography and Environmental Sciences, Northumbria University

Background

- 87% of English peatlands are degraded due to anthropogenic impacts such as drainage for agriculture and forestry, peat extraction and fire.[1]
- Projects such as Northumberland Peat Partnership (NPP) are working to promote restoration.
- Defining what a successfully restored peatland looks like is difficult.[2]
- Microbial communities are vital for peatland ecosystem functioning such as decomposition, nutrient cycling and greenhouse gas flux.
- However, their role in restoration is not adequately understood.[3]

Study Site

Whitelee Moor is a 1500 ha site undergoing active restoration by Northumberland Wildlife Trust.
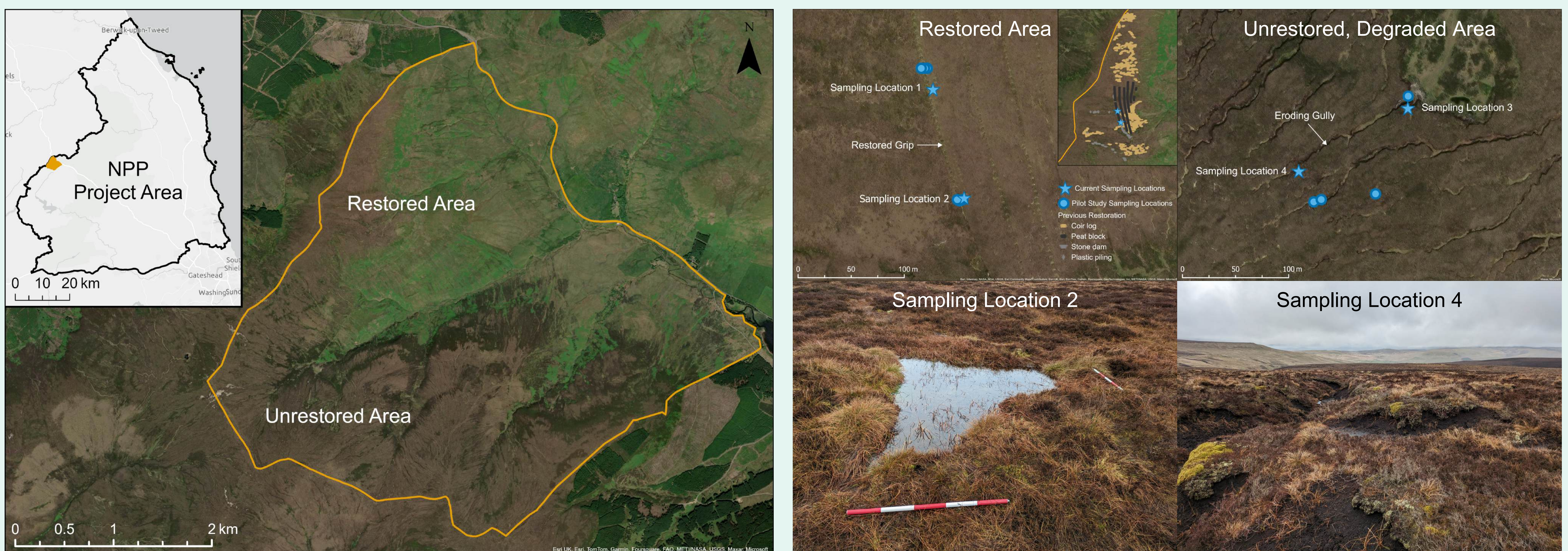
Research Questions

- **Can microbiology be used to study the efficacy of peatland restoration projects?**
- What microbial communities are present in restored and unrestored, degraded areas of Whitelee Moor?
- Do these communities show variation with respect to time, space and depth?

Methodology

- Pilot study collected 15 surface samples in January 2023.
- eDNA to characterise microbial (bacterial and archaeal) communities in restored and unrestored, degraded areas.
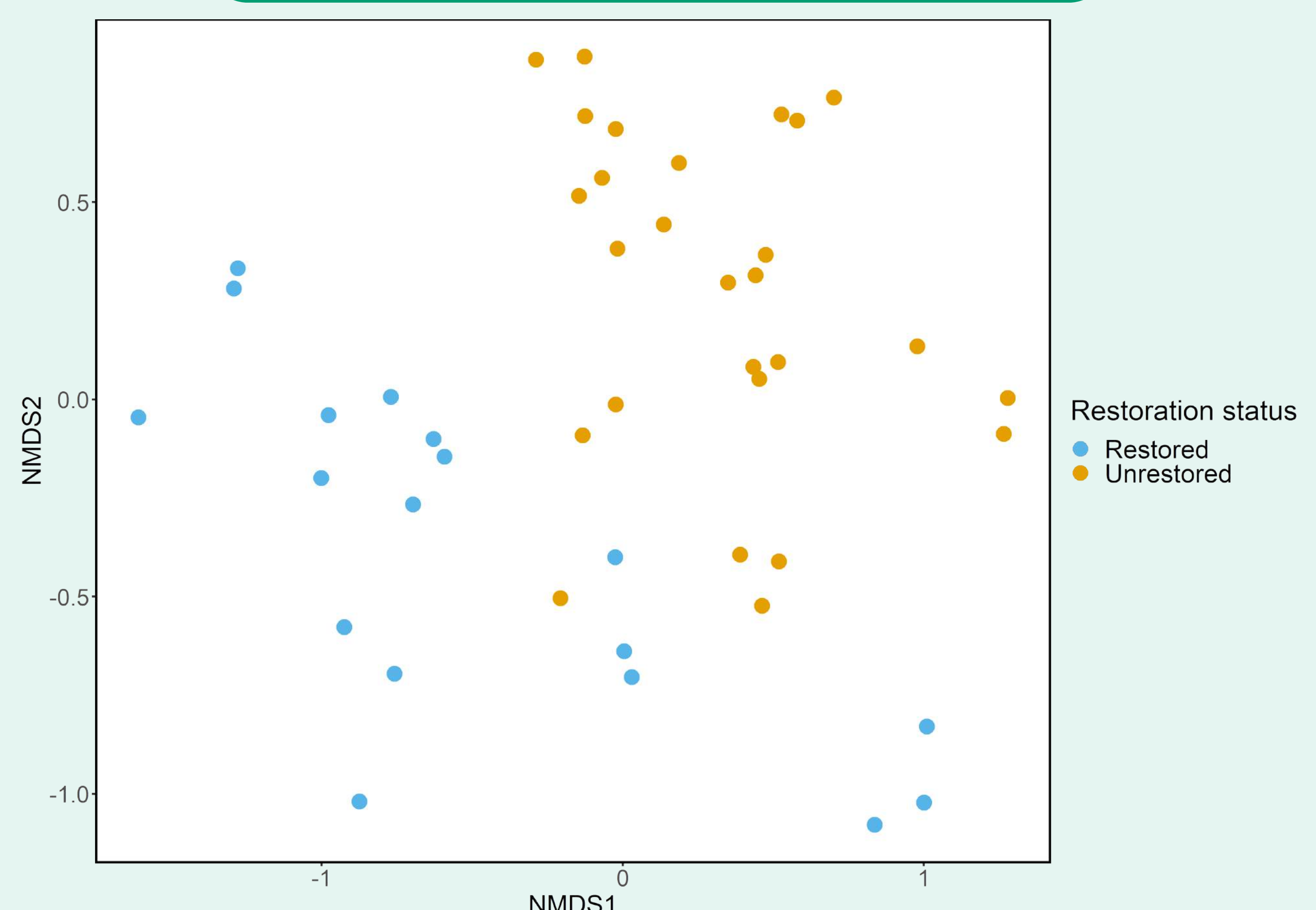
Next Steps

- Ongoing PhD carrying out seasonal sampling at different depths.
- Identify if key microbial groups (e.g. methanogens) and environmental factors are driving differences in community composition indicated by multivariate analysis.
- Investigate other microbial techniques (e.g. microbial metabolism and testates).
- Integrate palaeoecological approaches.
- Develop baseline datasets and microbial-based monitoring tools.

References

1. DEFRA, England Peat Action Plan. 2021.
2. Andersen, R., et al., An overview of the progress and challenges of peatland restoration in Western Europe. Restoration Ecology, 2017. 25(2): p. 271-282.
3. Ritson, J.P., et al., Towards a microbial process-based understanding of the resilience of peatland ecosystem service provisioning – A research agenda. The Science of the Total Environment., 2021. 759: p. 143467.

Pilot Study Results

Multivarite analysis indicate differences in microbial community composition between restored and degraded areas.