

Ecohydrological Characterisation of Wetlands in the Border Region of Ireland

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Introduction

Wetlands are areas that are periodically or permanently inundated by surface or groundwater and support vegetation adapted for life in saturated soil (Plate 1). Typically supporting a diverse ecology, wetlands are sensitive to changes in both surface or groundwater. They are geologically and physio-graphically complex and varied systems, are important stores of carbon and an important recreational and cultural resource. They are estimated to be worth €385 million per annum to the Irish economy.

Threats to wetlands include damage through drainage for agriculture (Plate 2), pollution from industrial, domestic and agricultural activity, over exploitation of groundwater resources and peat extraction (Plate 1).

There is a lack of baseline data for the full range of Irish wetlands and there remains limited understanding of how anthropogenic and climactic induced hydrological pressures impact on these local wetland systems. Groundwater Dependent Terrestrial Ecosystems (GWDEs) are currently under particular focus through EU legislative processes.

The key objectives of this study were to: (1) Increase the hydrogeological and ecological understanding of wetlands to facilitate cost-effective monitoring and effective management and conservation measures; (2) Use monitoring data to inform conceptual models of case-study wetlands; and (2) Elucidate locations and extent of wetland habitats in the border region.



Plate 1: Windy Gap cutover Bog, County Louth



Plate 2: Recent drainage works undertaken at a protected wetland

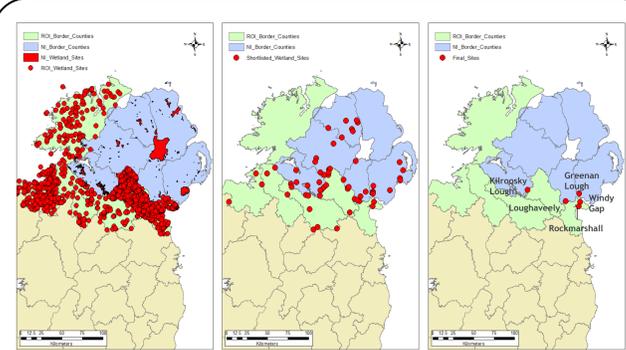


Figure 1: Shortlisting of wetlands for detailed ecohydrological monitoring

Site Selection

Data was collated for over 2,000 known wetland habitats within the border counties, and a selection matrix applied to shortlist wetlands for further investigation. Following site visits to over 30 sites, a final shortlist of 5 wetlands for detailed monitoring was produced (Figure 1; Table 1).

In addition, Tellus and Tellus Border geochemical data was used to examine the occurrence of wetland habitats across a range of geochemical and geological settings to understand where and why different wetland habitats occur within the border counties.

Table 1: Final shortlist of 5 representative border county wetlands

Site Name	County	Site Area (Ha)	Wetland Habitat Type
Kilroosky Lough	Fermanagh/Monaghan	23.53	Marl Lough
Greenan Lough	Down	18.24	Mesotrophic Lough
Loughaveely	Armagh	4.73	Fen
Windy Gap	Louth	5.48	Cutover Blanket Bog
Rockmarshall	Louth	23.00	Transition Mire and Fen

Examples of Results Part 1.

Wetland habitats occur over a range of different geological environments (Figure 2). Wetland environmental conditions can be heavily influenced by their underlying geology. For example in Northern Ireland, Marl Loughs are present only in areas where Limestone and Sandstone/Slates/Shales occur. Other more frequently encountered habitats such as Wet Heath and Wet Grassland are present over a wider range of underlying geology (Figure 2).

The Tellus Border geochemical dataset was used to assess key soil geochemical parameters that occur within a 1.5 Km radius of specific wetland habitats. For example, for Blanket Bog habitat in the Republic of Ireland, Aluminium and pH levels were highest in counties Louth and Monaghan, whilst these counties have the lowest values of Loss on Ignition (a surrogate for organic matter content) (Figure 3).

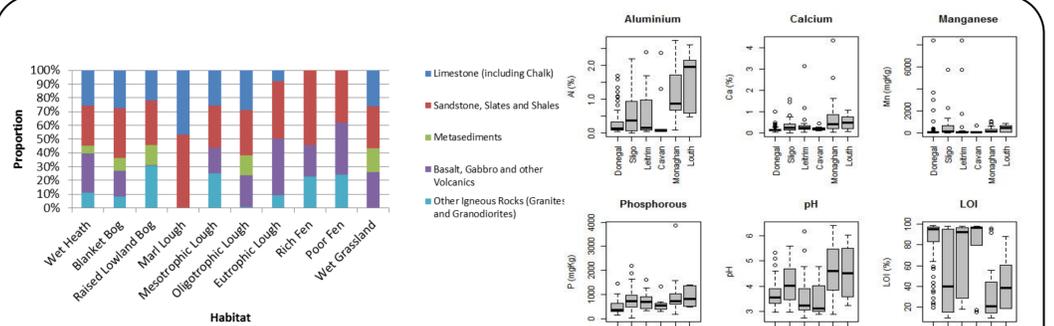


Figure 2: Underlying geology of Northern Ireland ASSI wetland habitats

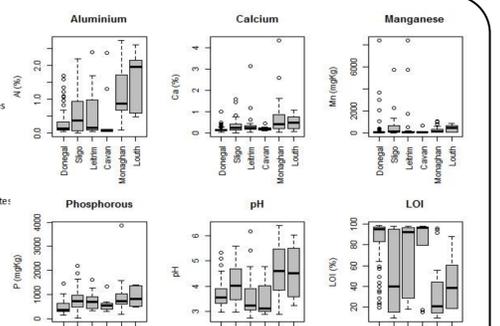


Figure 3: Levels of key topsoil geochemical parameters present within 1.5 Km of Northern Ireland Blanket Bog habitat.

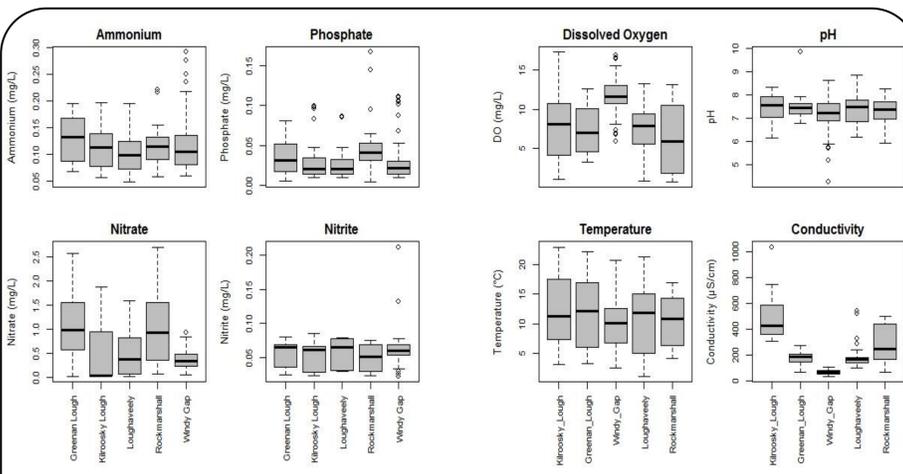


Figure 4: Nutrient levels in selected wetland habitat sites

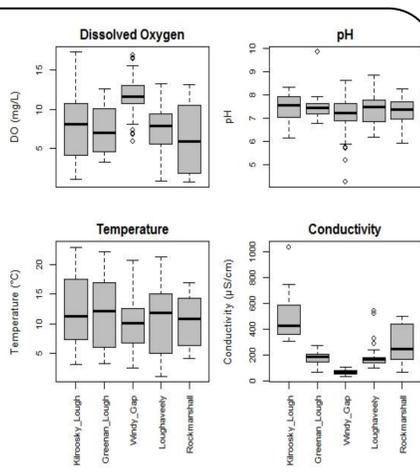


Figure 5: Environmental parameters in selected wetland habitat sites

Examples of Results Part 2.

Rockmarshall Fen and Greenan Lough surface water contained significantly higher Soluble Reactive Phosphorous (SRP) and Nitrate ($\text{NO}_3\text{-N}$) than other sites (Figure 4). Water temperatures and pH were similar between sites, but surface water conductivity was greatest at Kilroosky Lough and Rockmarshall where groundwater influence is important (Figure 5).

Aquatic macroinvertebrate communities at all sites were dominated by less sensitive species and diversity was typically low at all sites, reflecting the general condition of each site's water quality.

Vegetation surveys undertaken by Wetland Surveys Ireland have produced habitat maps for wetland sites and have reported two new county records for County Louth.

Groundwater assessments at Rockmarshall have shown within-site variation with regard to nutrient and water levels and highlighted potential point source and diffuse pollution issues.

Conclusions

Results collected through the monitoring of 5 representative wetland sites have been used to detail conceptual models for each site and inform a framework for undertaking wetland assessments in the border region that is also applicable at national and international levels.

The Water Framework and Habitats Directives are driving the need to further understand the functioning of wetland systems. The methodologies used and baseline data collected through this Tellus Border Wetlands Project will be used to outline future avenues and timelines for critical wetland habitat assessment and produce a tiered approach for identifying necessary processes required to move towards implementing the respective European Directives.