

The influence of drained peatlands on stream water chemistry: Ireland



C. Pschenyckyj, T. Donahue, M. Kelly-Quin, C. O'Driscoll, F. Renou-Wilson

@SWAMP_Project

Water quality in Ireland

Half of Irish rivers do not meet satisfactory water quality standards with many experiencing a continued decline, attributed to numerous pressures.

Peatland degradation has been identified as a dominant significant pressure for a number of water bodies across Ireland (Fig. 1), as well as contributing to decline in many others.

Crucially, there has been limited work done on understanding the impacts of extracted raised bogs on waters, with much work in Ireland focusing on afforested peatlands in a blanket bog landscape.

Aim

For the first time, we provide in-depth analysis of an array of chemical species found in streams within a heavy modified bog landscape, focusing on extracted raised bogs (Fig. 2).

Such information will also aid decisions in a time of transition in peatland management in this region and elsewhere in Europe.

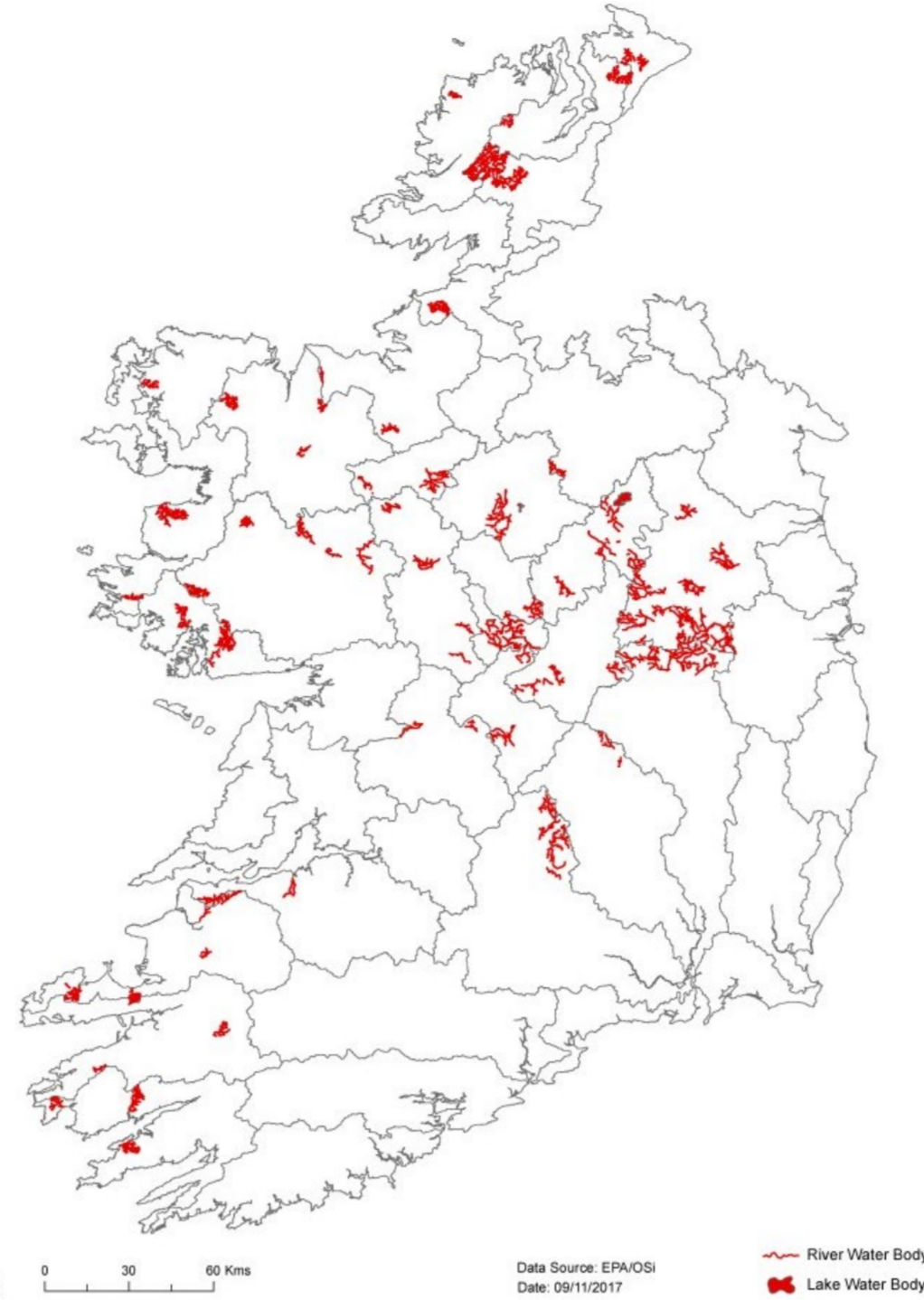


Fig. 1: At risk water bodies where peat is a significant risk. Source: <https://www.catchments.ie/significance/pressurepeat/>



Fig. 2: A raised bog which has undergone drainage and industrial peat extraction.

Monitoring

Degraded and near-natural (recently restored) raised bogs were sampled across the Irish midlands (Fig. 3), over 3 separate sampling periods. Water bodies sampled included streams within bogs, and downstream/upstream of these tributaries (Fig. 4).

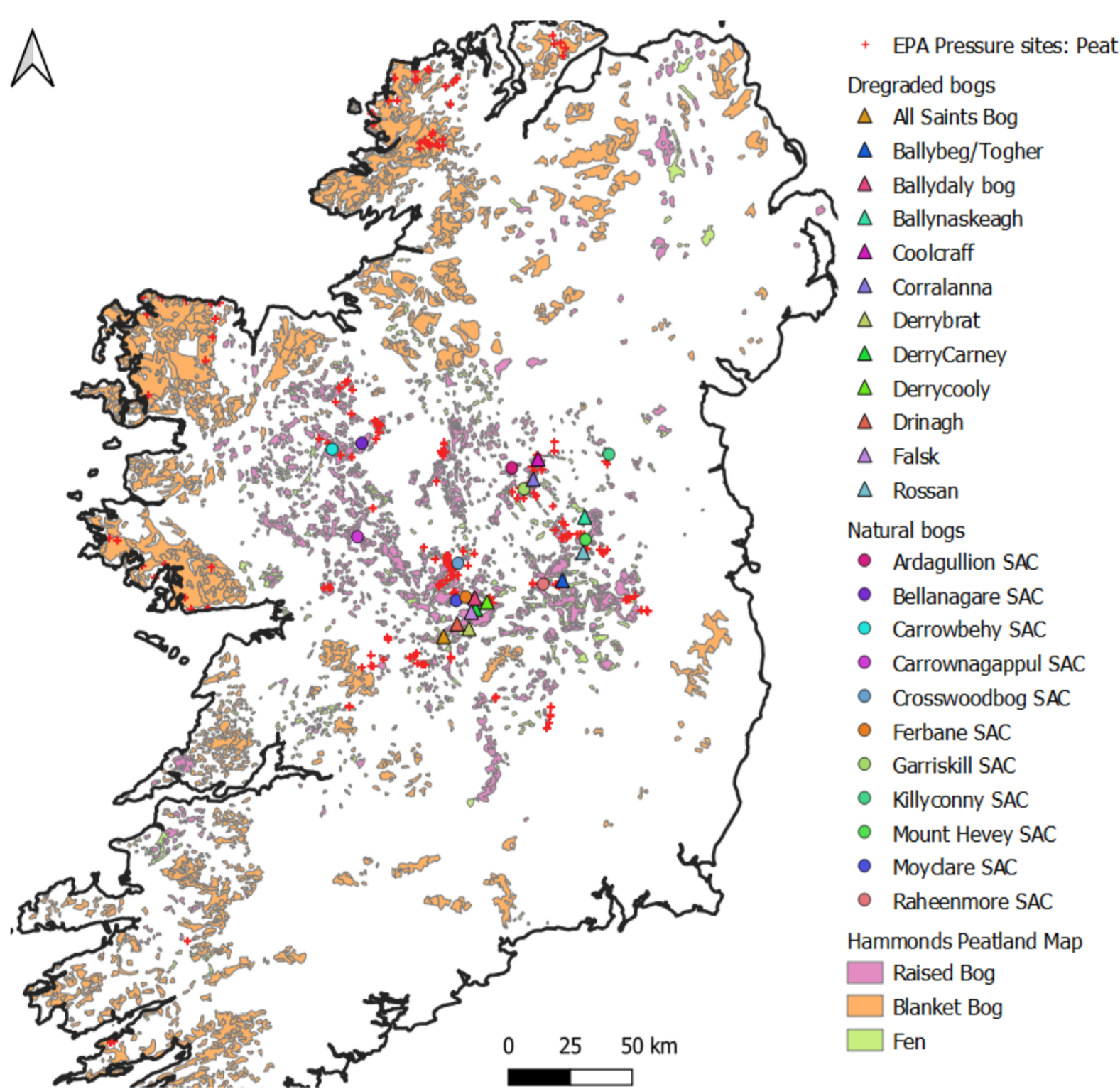


Fig. 3: Map of Irish midlands showing peatland types (Hammond 1981), Environmental Protection Agency pressure sites (red dots), and degraded (triangles) and natural (circles) bog locations.

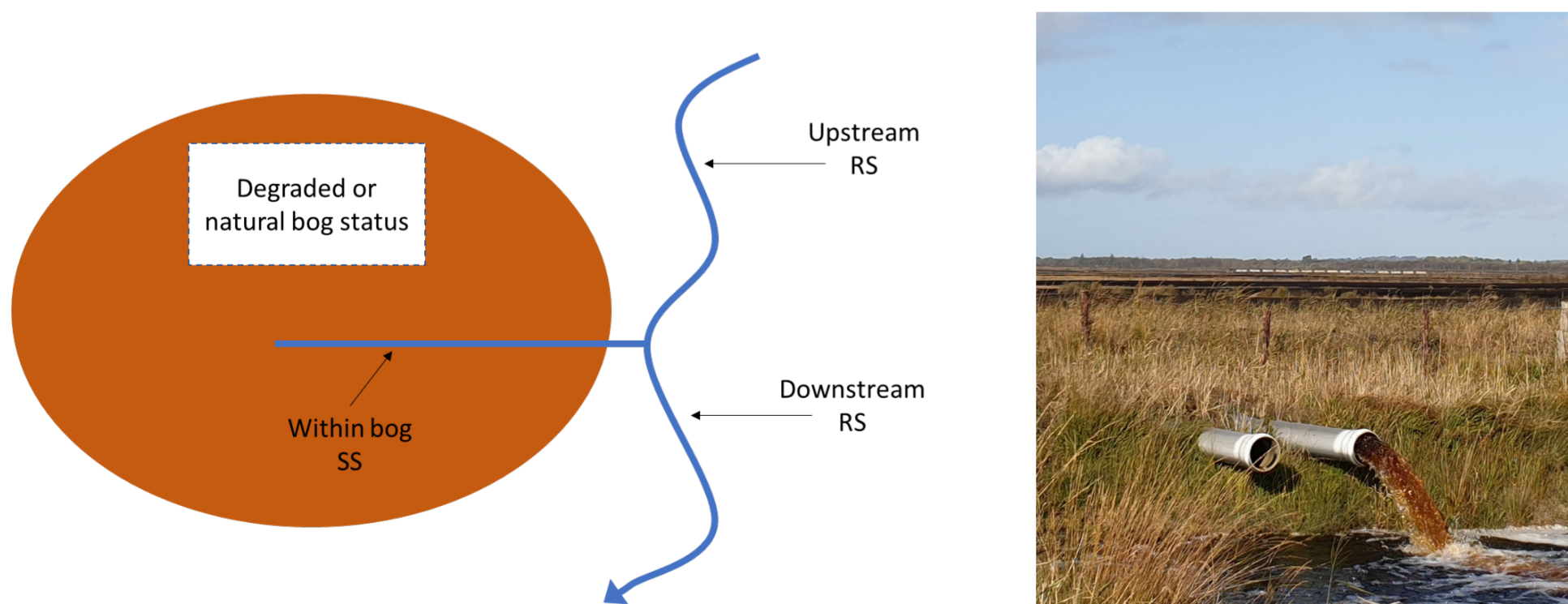


Fig. 4: Sampling location strategy, whereby samples were taken from a within bog small stream (SS), and upstream and downstream receiving stream (RS) where a within bog SS was a tributary.



Fig. 5: Coloured water leaving an extracted bog.

Results

Degraded bogs had significantly greater concentrations/values of electrical conductivity, total dissolved solids, dissolved organic carbon and total dissolved nitrogen, and a lower $SUVA_{254}$ value in their associated small streams.

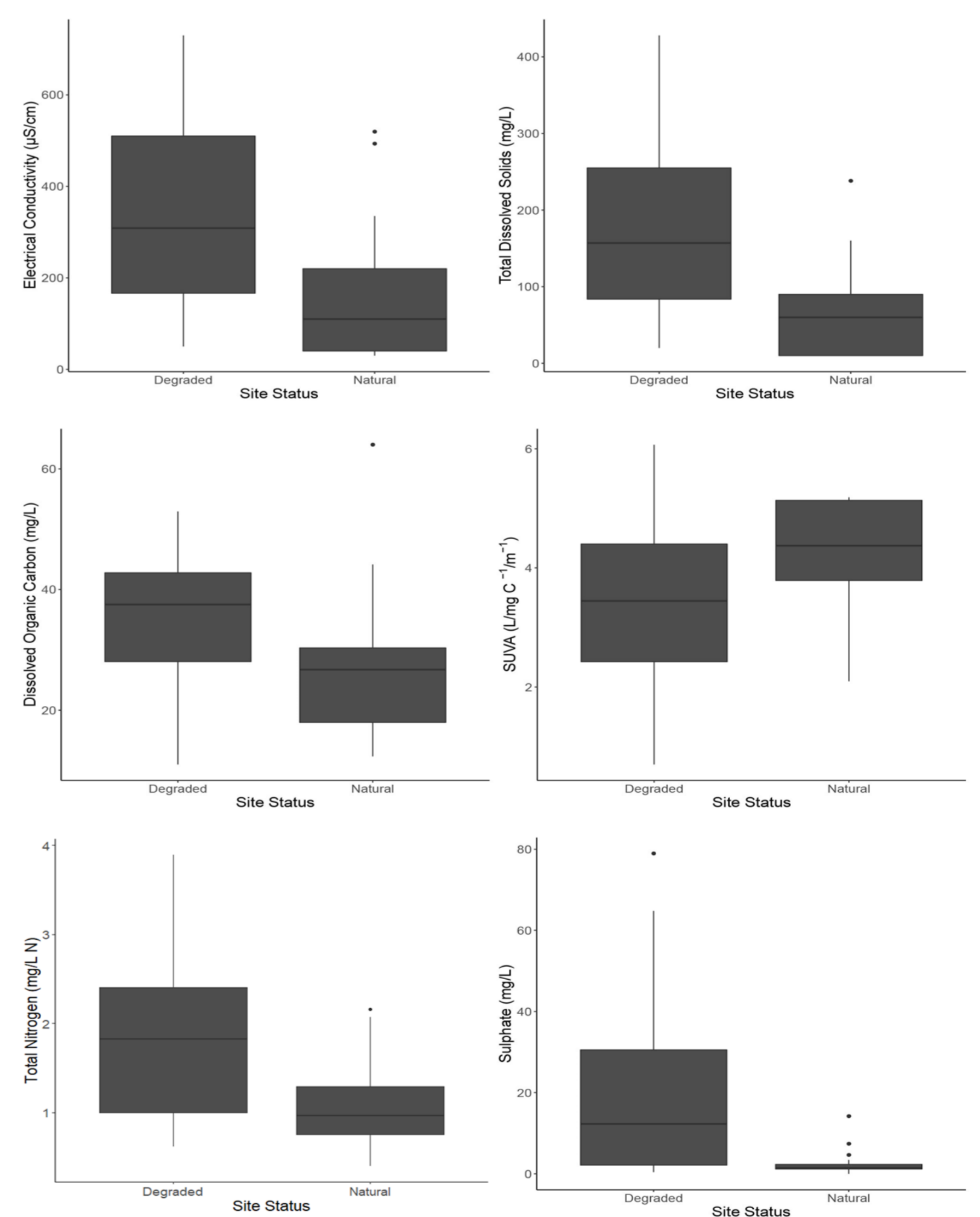


Fig. 6: Water quality results where there were significant differences between degraded and natural within bog streams.

While there were little difference for water quality between upstream and downstream of receiving streams. However, total ammonia concentrations were consistently above thresholds for good ecological status (0.065 mg/lN) (Fig. 7), confirming widespread degradation of these internationally rare ecosystems and surrounding surface waters.

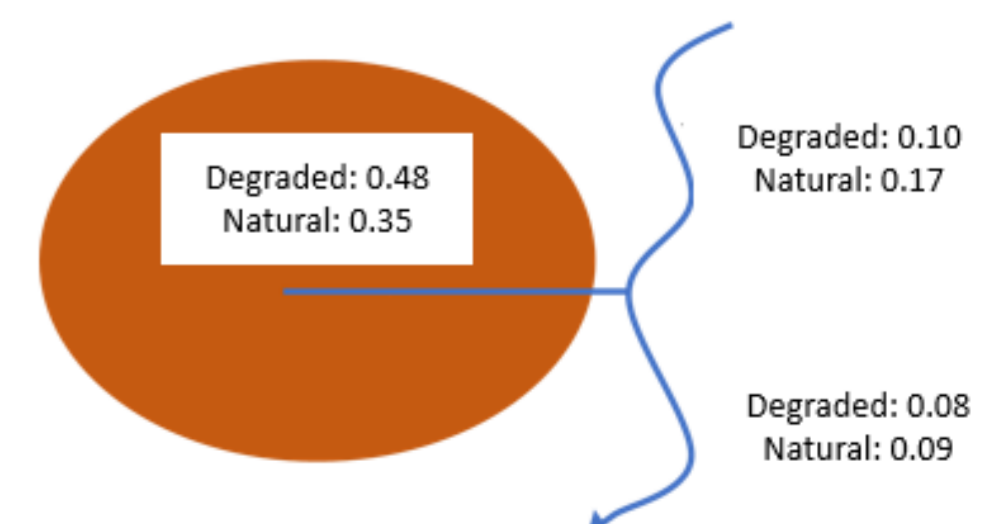


Fig. 7: Mean total ammonia concentrations (mg/l).

Results revealed a nitrogen pollution problem and point directly to its source: drained bogs. This provides a case for instruments via peatland rewetting to address site and landscape level pollution.

Funding

These projects are funded under the EPA Research Programme 2014-2020. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Environment, Climate and Communications. It is administered by the Environmental Protection Agency, which has the statutory function of co-ordinating and promoting environmental research.

Disclaimer

Although every effort has been made to ensure the accuracy of the material contained in this poster, complete accuracy cannot be guaranteed. Neither the Environmental Protection Agency nor the authors accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting or refraining from acting, as a result of a matter contained in this poster.

Contact information

For more information: Dr Florence Renou-Wilson Florence.Renou@ucd.ie or Dr Cat Pschenyckyj C.Pschenyckyj@tees.ac.uk