Impact of long-term drainage on summer groundwater flow patterns in the Mer Bleue peatland, Ontario, Canada

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SUPPLEMENTARY INFORMATION

1 Design and hydraulic response of piezometers

Piezometers were constructed from commercially available electrical PVC piping with 1-inch inner diameter using an electrical drill. The screen had a length of 10 cm and contained 55 inlets of a total are of 21.2 cm^{-2}, which accounted for 26 % of the inner and 20% of the outer area of the tube surface over this interval.

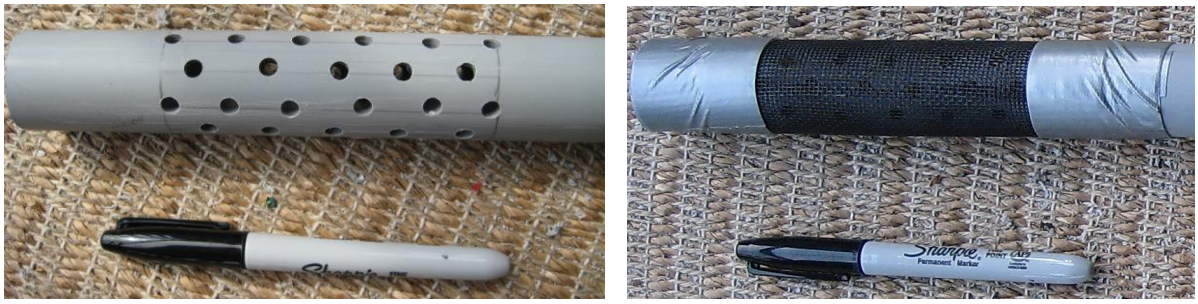


Figure S1 View of piezometer design after screening and application of mosquito-mesh to avoid clogging of the screen and excessive intrusion of peat material during piezometer insertion.

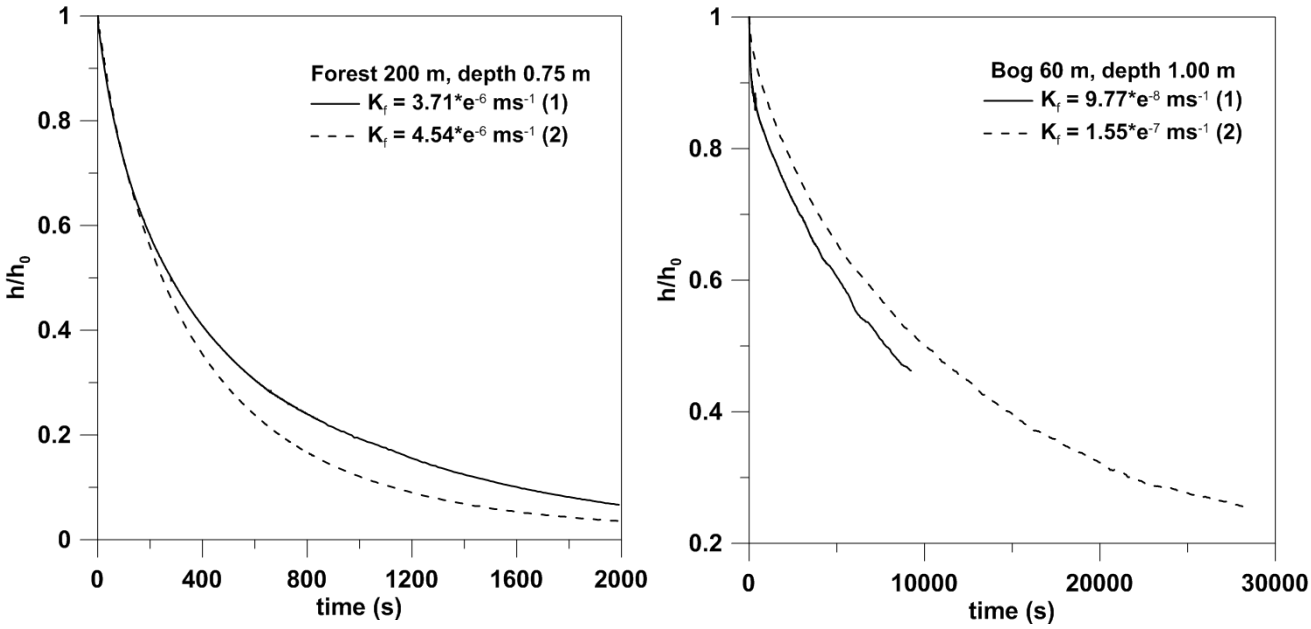
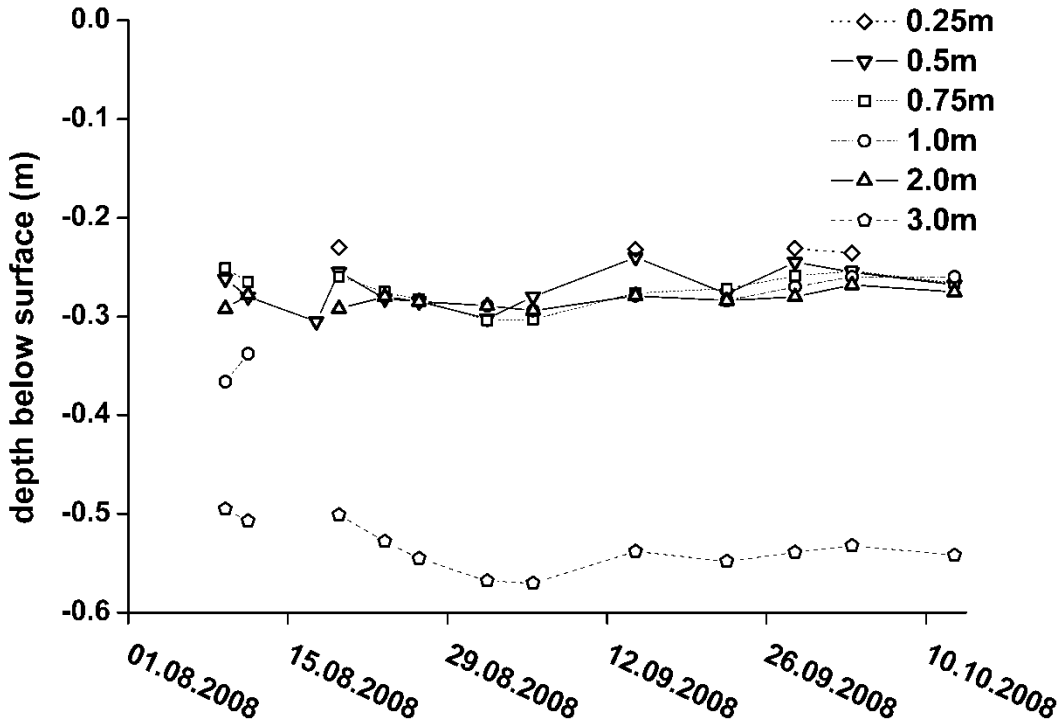


Figure S2 Response of hydraulic head in repeated slug tests following initial 'development' of the piezometers.

2. Results of hydraulic head measurements at additional piezometer nests in the investigated area

We installed additional piezometer nests at 45 m distance from the ditch and 30 m distance from the transect to obtain information in perpendicular direction to the main transect (Fig.1, main paper). In general, identified groundwater flow patterns were supported by these piezometer nests. At 45 m distance from the ditch at the bog side, hydraulic heads indicated a prevailing lateral flow pattern combined with a vertical component alternating between upward and downward gradients down to 2.0 m depth. Hydraulic potentials in 3.0 m depth were > 20 cm lower than in 2.0 m depth. This indicated a downward orientated flow in deeper catotelm peat (Fig. S 3) which is coherent with modelled hydraulic potentials using the MODFLOW model as described in the paper. In the same distance from the ditch under forest the hydraulic heads remained upward directed throughout the study period (Fig. S 4).

As a reference site not influenced by drainage, we installed an additional piezometer nest at a distance of 600 m from the ditch to monitor hydraulic heads at a pristine part of the bog, which can thus be assumed to be unaffected by drainage. Maximum water table fluctuations of 6.1 cm were rather small and similar to manual measured fluctuations of 6.3 cm at the 200 m site (data not shown). Hydraulic heads at the 600 m site were dominated by lateral flow with a discharging vertical flow component until the end of August and slightly downward orientated flow established in the beginning of September (Fig. S 5).



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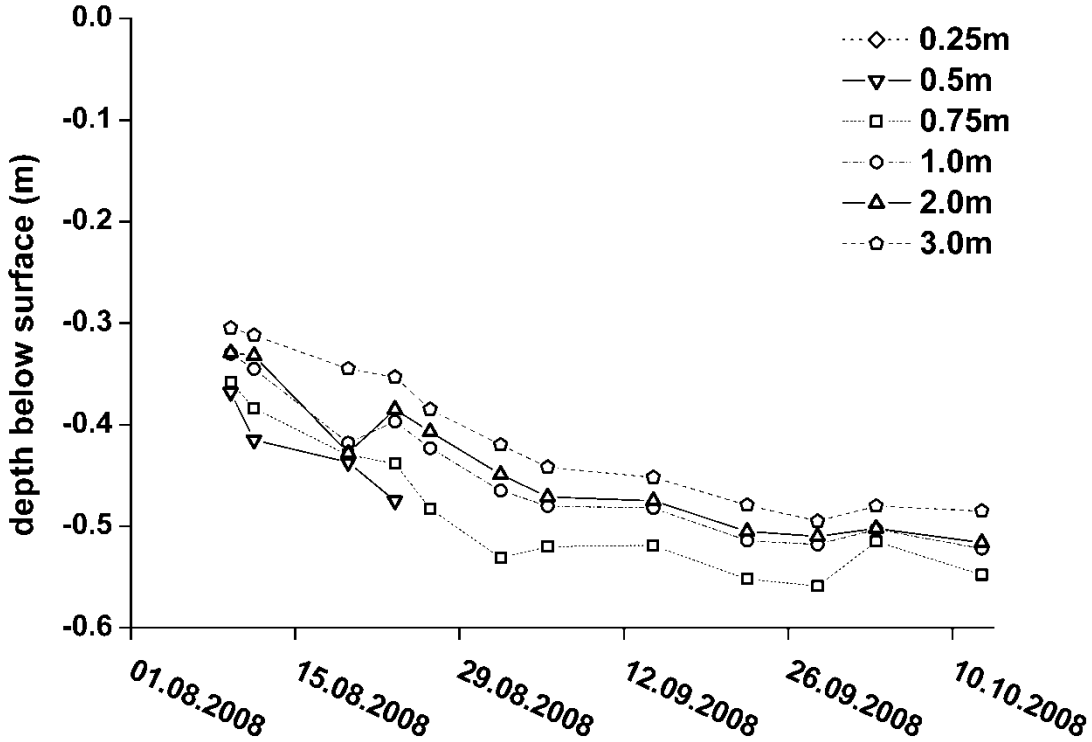
48 **Figure S3** Manual measurements of hydraulic potentials at the piezometer nest in 45 m
49 distance from the ditch in the bog.



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51 **Figure S4** Manual measurements of hydraulic potentials at the piezometer nest in 45 m
52 distance from the ditch in the forest**.**

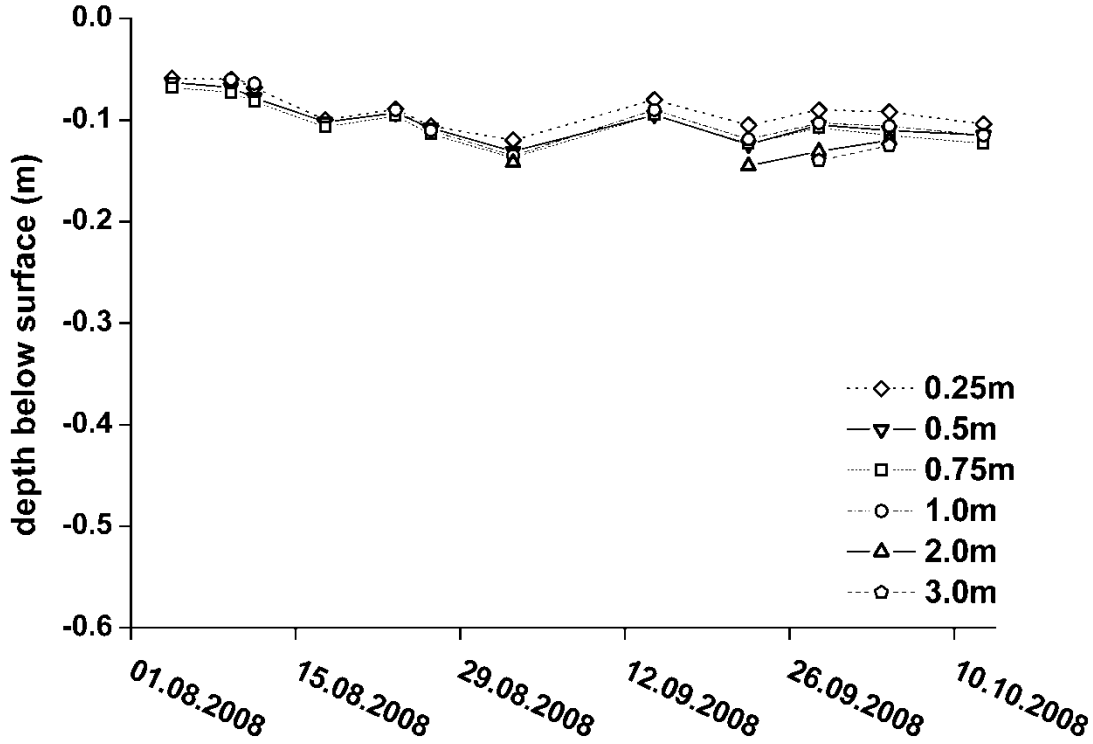

Figure S5 Manual measurements of hydraulic potentials at the piezometer nest in 600 m distance from the ditch in the open bog.