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Do sparse tree stands maintain disturbed hydrology in forestry-drained, low-productive peatlands?

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Water-level drawdown by ditching to enhance tree growth has been a significant form of land-use even on low-productive peatlands in northern Europe. Owing to poor wood production potential and many environmental disadvantages of continued maintenance for forestry, there is a growing interest of restoring the natural ecosystem services of these peatland sites. Restoration of hydrology is obviously a key factor in these efforts. As the evapotranspiration of tree stands are known to maintain increased depths to water level from soil surface (DWL), considerable reduction of the canopy cover of tree stands evolved following forestry drainage may often be needed for initiating a successful restoration process.
The impacts of various re-use options on low-productive forestry-drained peatlands, totaling up to 0.8 million ha in Finland alone, are being studied in a new 5-yr EU LIFE+ project. The management options aiming at restoration include, i) leaving the sites without measures, ii) (partial) tree biomass harvesting + abandonment from active forestry, and iii) active measures for restoration towards a natural peatland ecosystem, including (partial) tree stand harvesting. In all options, at least part of the live trees may be retained as this may be feasible regarding the cost efficiency and/or restoring some of the desired ecosystem services. We aim at uncovering the interactions of DWL and various levels of tree stand stocking on low-productive, forestry-drained peatland stands when managed according to the above-mentioned options.
Results indicate that even a moderate reduction in tree stand volume or canopy coverage significantly decreases average DWL during the latter parts of the summer season, i.e. from mid July to late August, and results in clearly larger fluctuation of DWL owing to summer season rainfall events. This impact, however, appeared to level off during a few years if the stand thinning was applied according to general forest management practices. This is probably due to the fairly rapid recovery of the stand-level foliar biomass. Our results suggest that measures aiming at restoring the natural levels of DWL call for fairly heavy cuttings of tree stands if no active filling of ditches is carried out.