

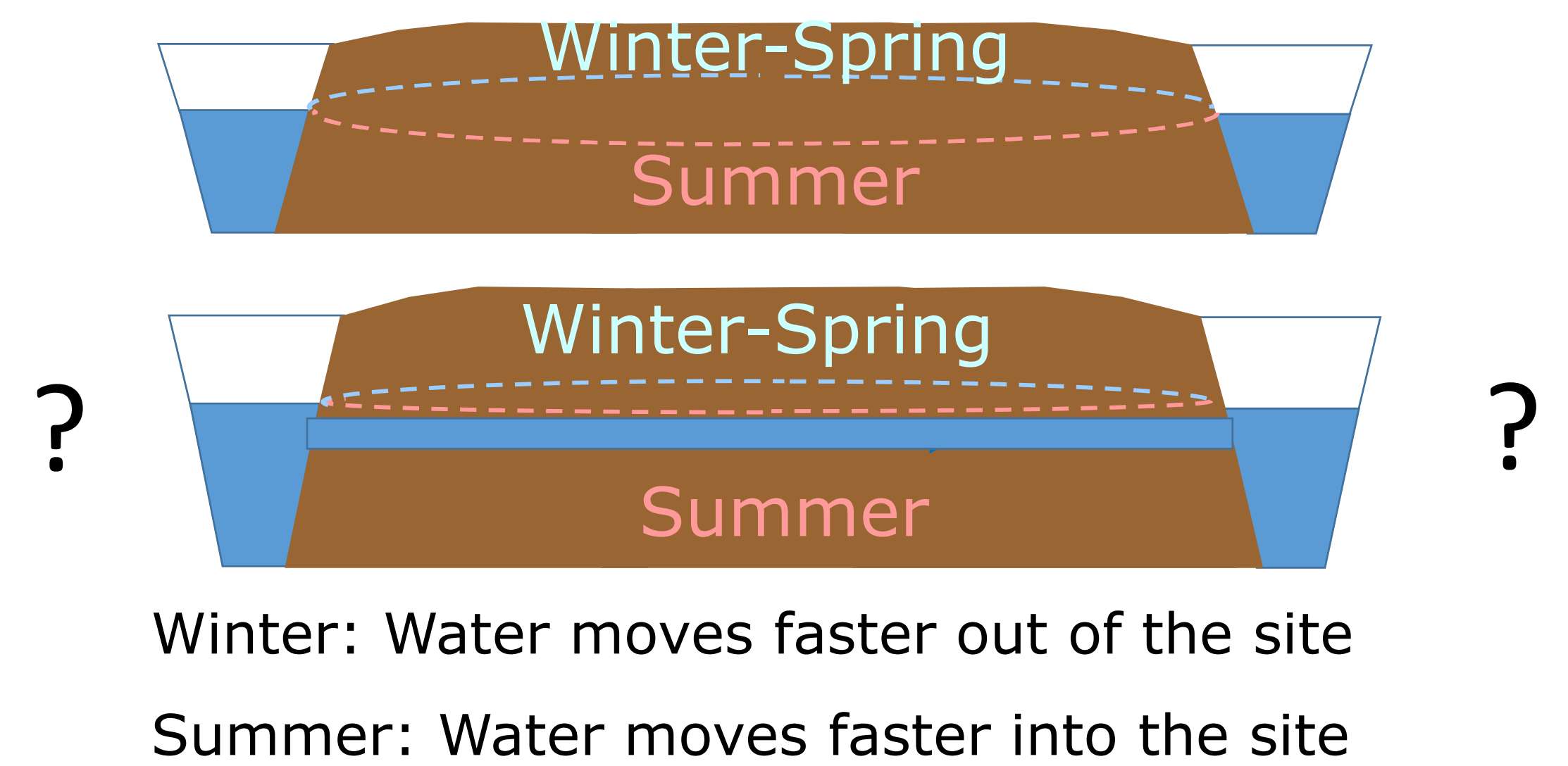
Maintenance of high peatland water levels by subsurface water regulation

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Introduction

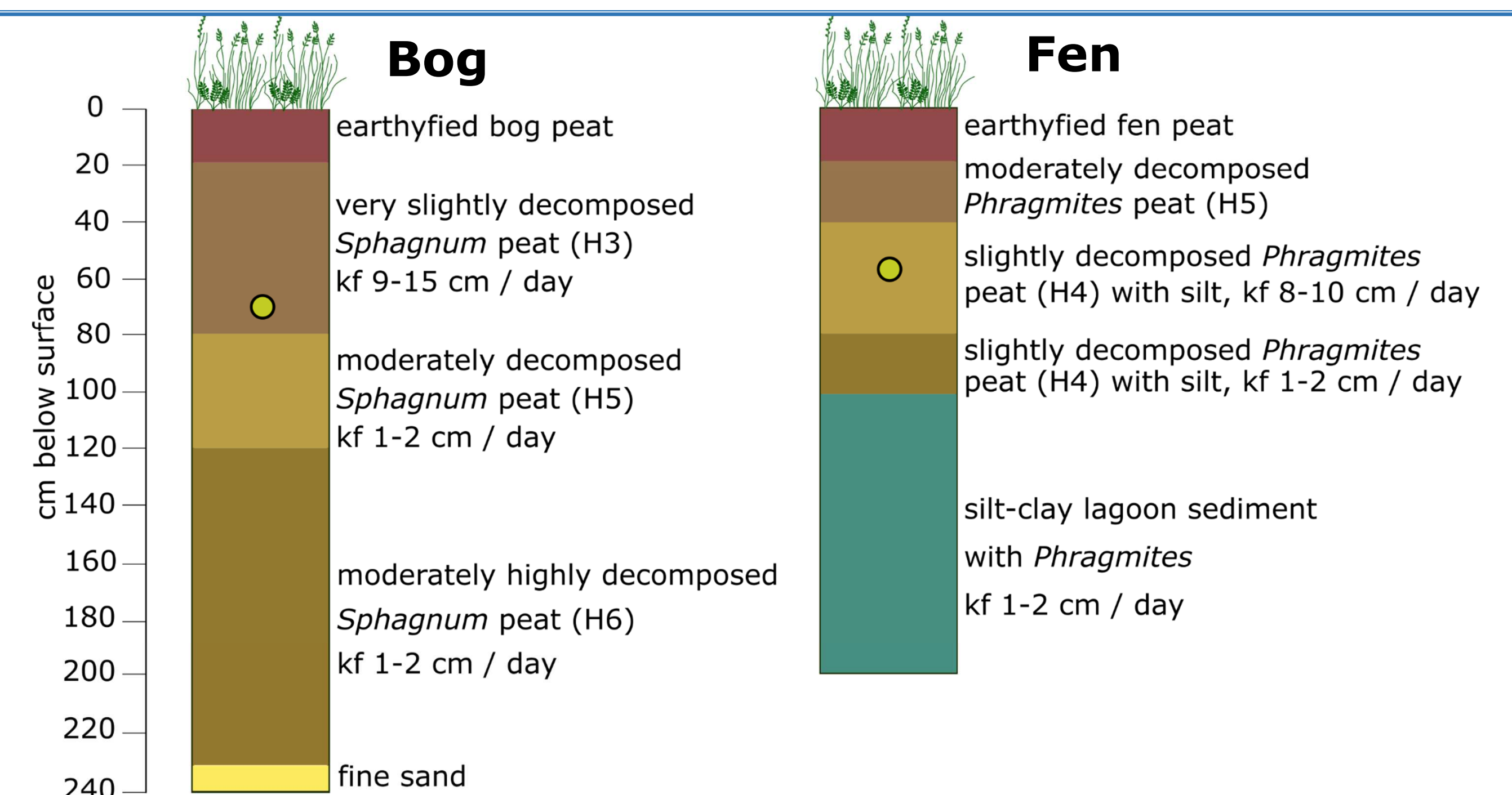
Large fen and bog areas in Lower Saxony (Germany) are used as grasslands. Raising the water level to 30 – 40 cm below surface may reduce peat oxidation and GHG emissions from such sites and still allow for grass production. Due to the small water conductivity (kf) of the degraded peat high summer water levels can be hardly achieved by ditch blocking alone.

Question: Can subsurface water regulation help to achieve and maintain high peatland water levels?

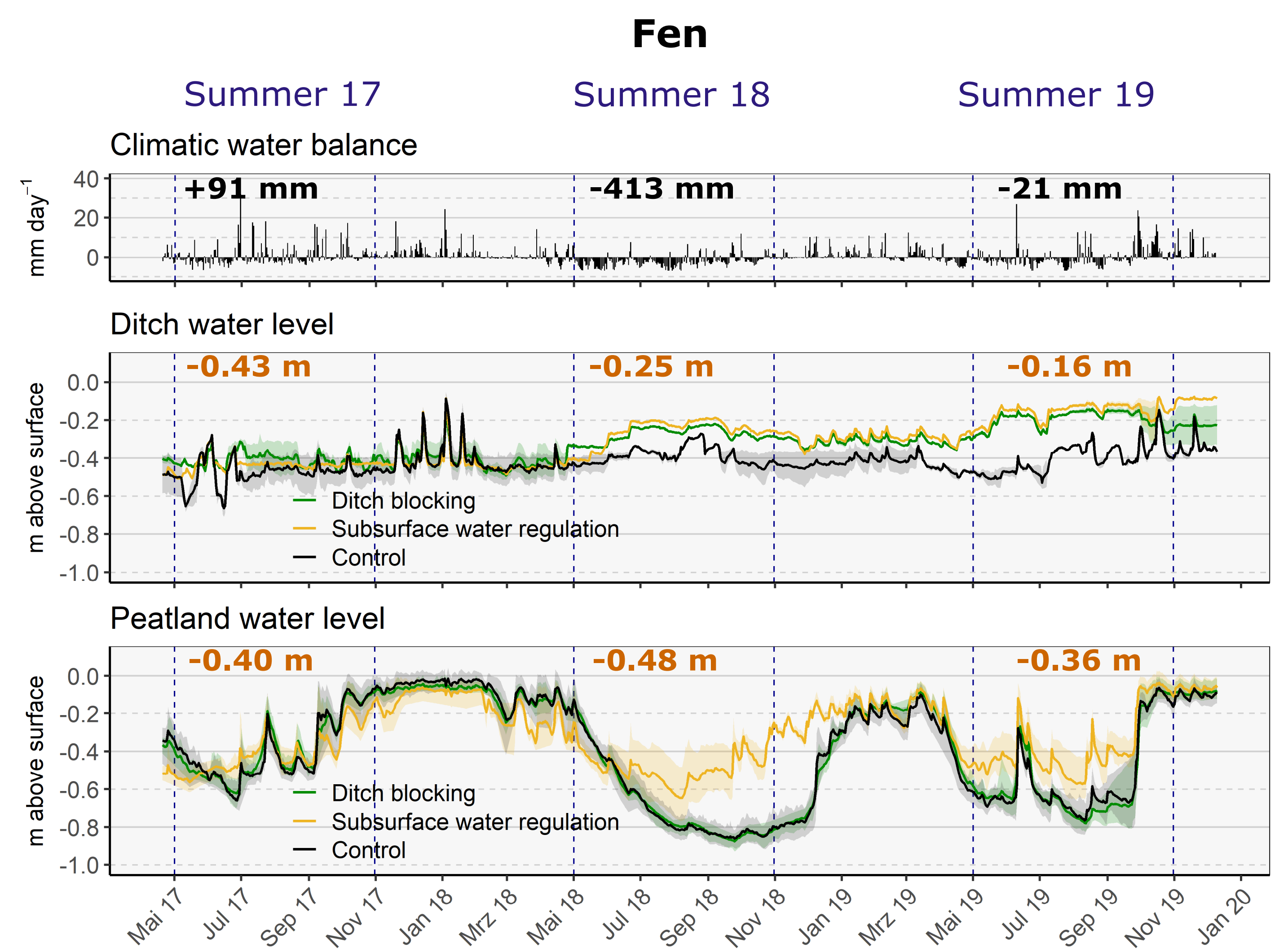
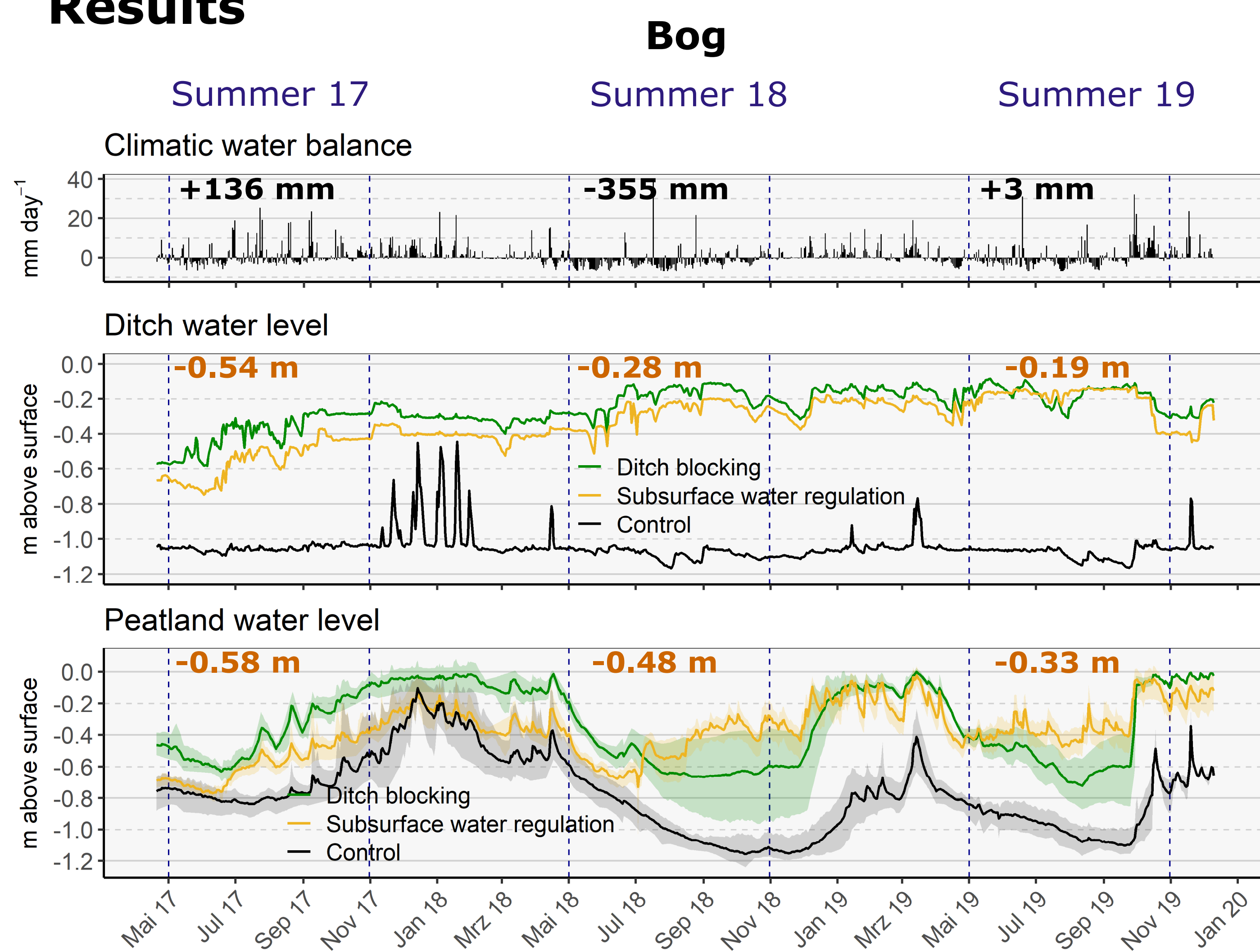


Methods

- Two sites: Ipweger Moor (bog) and Hammelwarder Moor (fen)
- Three treatments: ditch blocking, subsurface water regulation, control
- Subsurface water regulation by submerged drains (bog: diameter 6 cm, depth 70 cm, spacing 5 m, fen: diameter 8 cm, depth 55 cm, spacing 4 m)
- Solar pumping of water from adjacent ditches
- Water level monitoring at 5 to 8 wells per treatment



Results



* Black numbers are mean summer climatic water balances (mm), brown are mean summer water levels (m above surface) of subsurface water regulation

Discussion and Conclusion

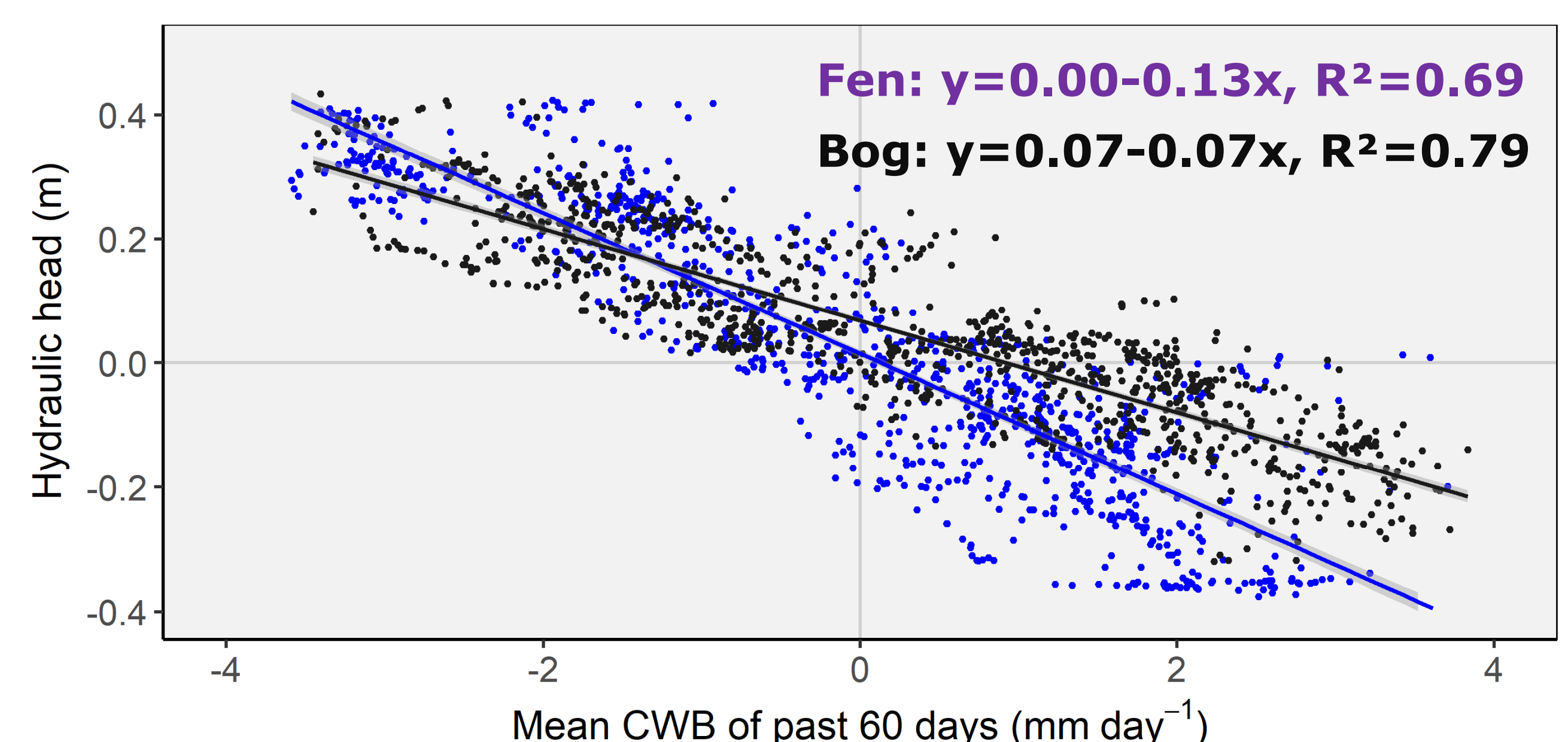
- Winter peatland water levels always above ditch water levels
- In wet summer 2017 ditch water levels were too low to increase peatland water levels
- In dry summers only subsurface water regulation allowed for high peatland water levels: 48 cm below surface in 2018, 33 cm and 36 cm at bog and fen, respectively, in 2019

-> Subsurface water regulation is suited to keep peatland water levels high

Consider hydraulic head

- Dry summers require ditch water levels of up to 0.4 m and 0.3 m above target peatland water level at fen and bog, respectively
- Hydraulic head depends on kf and climate water balance

Hydraulic head, subsurface water regulation



- > Ditch based subsurface water regulation possible, when**
- kf ≥ 10 cm/day, land surface flat, and ditches can be completely filled with water during summer