**Supplemental material**

**Table S1: Evapotranspiration parameter used in the model setup of this study, table adapted from Glaser et al. 2016. Root depth and interception storage parameters for the coniferous forest were changed compared to the calibrated parameter values of Glaser et al. 2016. The leaf area index was set to zero for all vegetation types, since this showed to reduce the calculation time during dry conditions substantially without a pronounced effect on the simulated discharge and surface saturation (while the partitioning between transpiration and evaporation changed).**

| | Deciduous tree land | Coniferous tree land | Riparian zone + streambed |
|---|---|---|---|
| Root depth (m) | 2 | 1.5 | 0.5 |
| Root distribution function | Cubic | Cubic | Cubic |
| Evaporation depth (m) | 0.2 | 0.2 | 0.2 |
| Evaporation distribution function | Cubic | Cubic | Cubic |
| Transpiration fitting parameter C1 | 0.3 | 0.3 | 0.3 |
| Transpiration fitting parameter C2 | 0.2 | 0.2 | 0.2 |
| Transpiration fitting parameter C3 | 0.7 | 0.7 | 0.1 |
| Canopy storage parameter (m) | 5.00E-04 | 7.50E-04 | 1.00E-04 |
| Initial interception storage (m) | 5.00E-05 | 7.50E-05 | 1.00E-05 |
| Wilting point saturation | 0.165 | 0.165 | 0.165 |
| Field capacity saturation | 0.51 | 0.51 | 0.51 |
| Oxic limit saturation | 0.7 | 0.7 | 0.8 |
| Anoxic limit saturation | 0.9 | 0.9 | 0.98 |
| Evaporation limiting saturation (min.) | 0.1 | 0.1 | 0.1 |
| Evaporation limiting saturation (max.) | 0.5 | 0.5 | 0.5 |

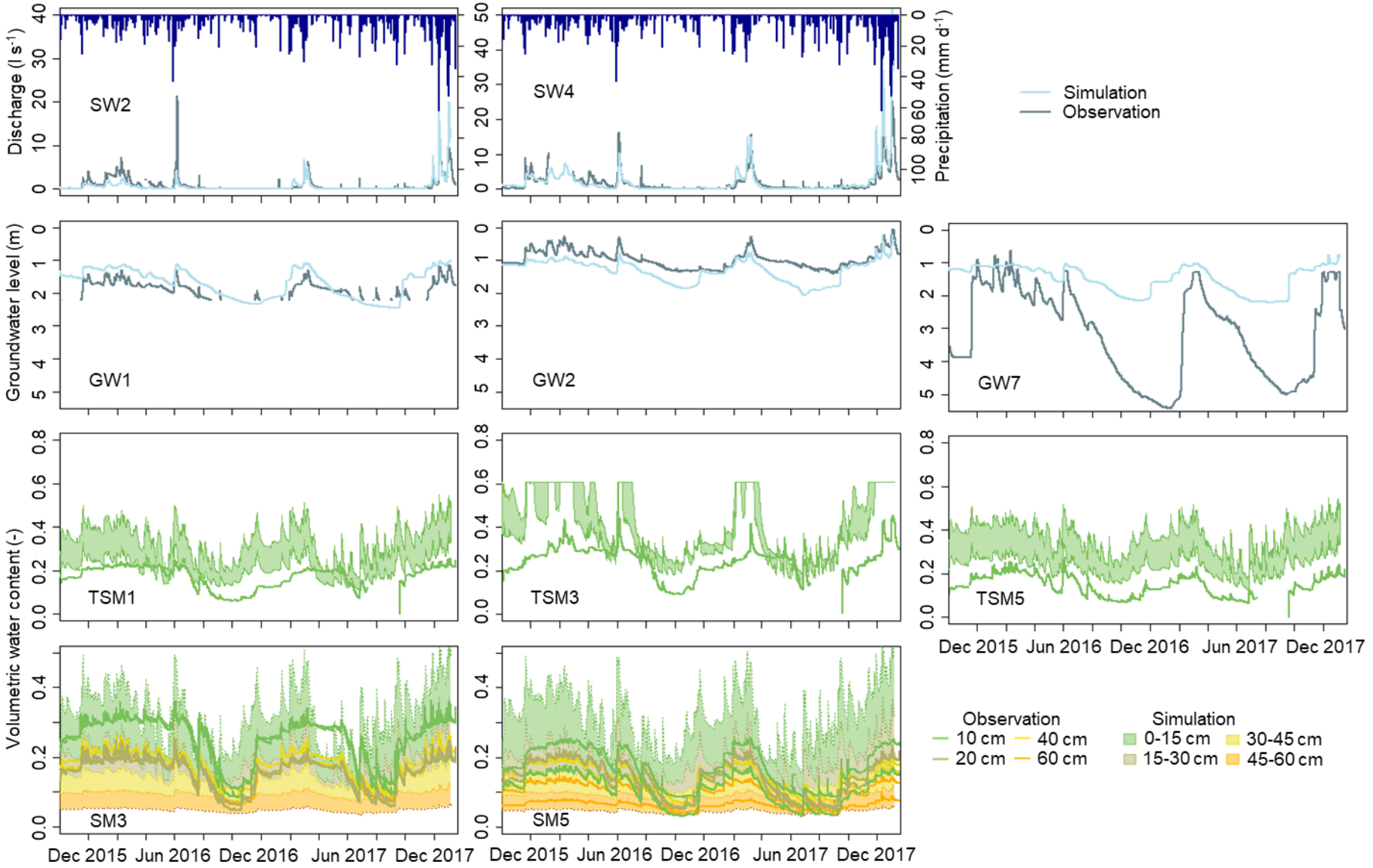


**Figure S1: Simulated and observed time series of discharge, groundwater level below the surface, and volumetric water content. Colour bands indicate the possible span of simulated volumetric water contents in the depths between two model nodes. The time series of the observation locations (cf. Figure 1) that are not shown here, are shown in Figure 3.**

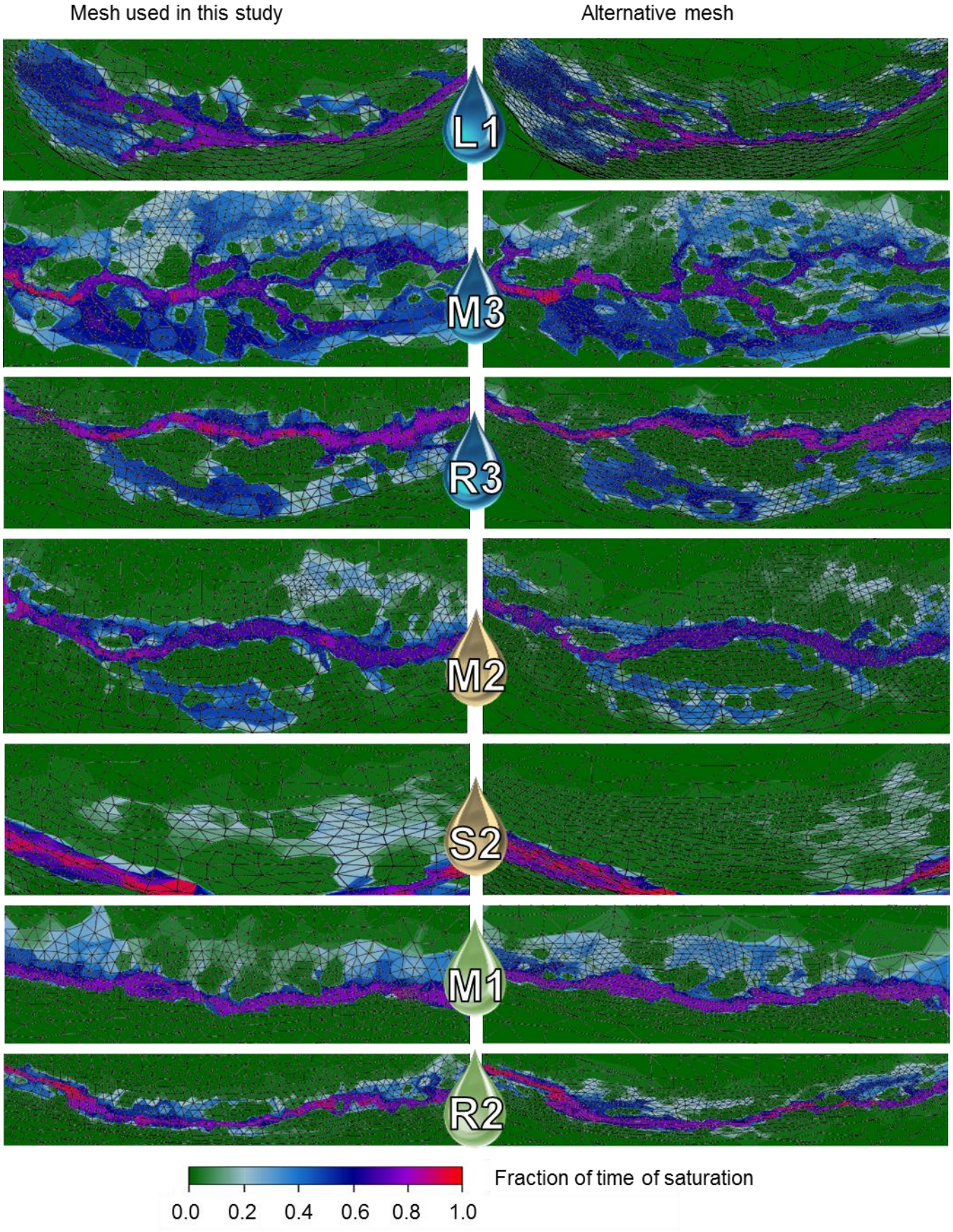


**Figure S2: Comparison of simulated frequencies of surface saturation in the seven investigated riparian areas for two different model meshes. Left: mesh as used in this study; Right: alternative mesh with finer resolution in the riparian areas.**