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Linking topographic indices to riparian peat soils and streamwater chemistry in the Krycklan boreal catchment, Northern Sweden

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The riparian zone has been hypothesized to be a major control on stream water chemistry in boreal catchments with relatively shallow flowpaths. If this is true, then the structure of the riparian zone and the interaction of its structure with lateral flows should hold the key to understanding landscape scale patterns in stream chemistry. The variability in the riparian zone, however, has rarely been investigated. In this study we present results from a soil and vegetation survey of 180 transects through the riparian zone of a 68 km2 catchment in Northern Sweden. We then test whether high-resolution, LIDAR-based topographic indices can predict key aspects of riparian peat soils. In this study, we focus on three variables constructed from riparian survey data relating to the cross-sectional profile of peat in the near stream zone, since peat is commonly found to be a variable that correlates well to the pattern of water chemistry in a stream network. Those variables are peat depth adjacent to the stream, total cross-sectional area of peat, and distance to the boundary between riparian peat and upslope mineral soil. When correlating these variables to a suite of topographic indices, the strongest relationships between riparian soils and local catchment topography are found in the headwaters. There the upslope contributing area, mean elevation above the stream channel and topographic wetness index have the greatest explanatory

power. Finally, we relate the topography-based predictions of riparian peat soils to the marked spatial patterns in the chemistry of streamwater which have been observed in this catchment.