Leena Stenberg¹, Tapio Tuukkanen², Leena Finér³, Hannu Marttila², Sirpa Piirainen³, Bjørn Kløve², and Harri Koivusalo¹

¹Aalto University School of Engineering, Department of Built Environment, Espoo, Finland (leena.stenberg@aalto.fi) ²University of Oulu, Water Resources and Environmental Engineering Research Group, Oulu, Finland Natural Resources Institute Finland, Joensuu, Finland

Terrestrial laser scanning and pin meter measurements for erosion and roughness assessment in boreal peatland forest ditches

Introduction

Ditch network maintenance in managed forests increases erosion and sediment transport. This has negative environmental impacts on downstream ecosystem. Better understanding of the source area processes and mechanisms is required for joint land management and water protection. The present work focuses on reliable methods to estimate erosion and roughness in newly cleaned peatland forest ditches with objectives to:

- Quantify changes in ditch cross-sections and surface roughness.
- Compare terrestrial laser scanning (TLS) and pin meter measurements in drained peatland conditions.



2 Methods

TLS and pin meter measurements were applied to 4 m long sections of two ditches:

- Ditch A: peat ditch

Measurements were repeated 4–5 times from August 2011 (ditch cleaning) to June 2013.

TLS data processing

Ditch cross-sections Lowest points for 0.02 m x 0.02 m window

Erosion and deposition quantities

- Lowest points for different window sizes
- TIN \rightarrow Natural neighbor interpolation \rightarrow DEM at 0.02 m x 0.02 m resolution
- Difference between measurement times

Pin meter data processing

Ditch cross-sections Cross-sections measured at 0.02 m pin resolution with 0.2 m intervals

Erosion and deposition quantities

- Ordinary kriging interpolation for 0.02 m x 0.02 m grid
- Difference between measurement times



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• Ditch B: a ditch with thin peat layer underlined by stony till











