MWP – Young Researcher Abstract 2025

Project title: Cross-generation genomic selection of Norway Spruce, an evaluation with real and simulated data	
Author: Edward Carlsson	
Affiliation: SLU, Skogforsk	**E-mail: Edward.carlsson@skogforsk.se**

Abstract (approx. 200 words):
Forests are typically regenerated with seedlings from genetically superior trees, as a result of long-term efforts of tree-breeding programs. Unfortunately, the long rotation times required by commercial tree-species present a major bottleneck for genetic gain and hinders the adaptability to climate change. To help resolve these issues, my research focuses on the implementation of Genomic Selection (GS) on Norway Spruce. Using genetic markers, selection of the best trees takes place at the seedling stage, bypassing the time required for phenotyping and accelerating the breeding cycle. GS efficiency was evaluated using 1910 Norway Spruce trees across 16 clonally replicated field trials, genotyped with a 50K SNP chip. The trees came from one generation of plus-trees and one subsequent generation of full-sib families. A computer simulation was designed to replicate this analysis. As the trustworthiness of the simulation tool was established, I used it to expand my study beyond the scope the current breeding program to explore the efficiency GS in future generations. My results show that currently, GS across generations is too inaccurate when selecting for the best candidates within all families. However, simulations indicate an increase in accuracy for future generations, likely by building more LD in the breeding populations.

Key words:
Genomic Selection, Norway Spruce, Computer Simulation, Tree Breeding, Within-Family Selection