European spruce bark beetle damage measurements in Eco2Adapt project

European spruce bark beetle damage measurements were made in summer 2023 related to the Eco2Adapt project. Material from measurements is used by Bitcomp to improve bark beetle damage identification from satellite images. The aim was that 1/3 of the measurement sites would be healthy, 1/3 weakened and 1/3 dead.

Measurement sites were in North Karelia, Finland. Most sites were potential damage sites which had been selected with the help of insect damage reports, forest use declarations, satellite images, and information of forest age and tree species composition. Some measurement sites were made based on forest organizations field workers' observations of insect damages. Also, measurement sites were made spontaneously if good insect damage came across when making measurements. In total 226 sites were measured during three-month period.

Measurement sites were circles with nine-meter radius. In every site, location, site information and tree measurements (tree species, condition of tree, tree diameter, tree hight) and tree distance from the center of site were measured. Tree condition included normal living tree, damaged living tree, dead tree and other more specific classes. Information of damage (pitch leak, bark damage, holes in bark, change of canopy color and dripping of needles) was added to other than normal living trees. Sites were found using QField map application. Every site and possible tree damages were photographed, and the measurements and photos were transferred to Forest Centre's database.

Based on the measurements, spruce bark beetle (and other insect) damage situation is not very severe in North Karelia, if compared to Southern Finland or especially to Central Europe. Small insect damages, from one to a couple of damaged or dead trees, came along often but bigger damage sites (10-20 damaged or dead trees) were rarer occurring one or two times a week. There was usually some exposing factor on bigger damage sites such as storm damage or proximity of a clear cutting. The biggest spruce bark beetle damage sites were usually in old spruce forests where trees were big and were located in the edge of a clear cutting but sometimes damage sites were in the middle of the forest and/or in smaller trees. **It seems that the biggest risk factor to insect damages is old spruce forest's location on the edge of a clear cutting.**

This work was done to enable learning data to develop accurate remote sensing techniques for proactive damage monitoring. This work is one contribution made by "Ecosystem-based Adaptation and Changemaking to Shape, protect and Maintain the Resilience of Tomorrow's Forests.

Picture: Minna Luoto, Finnish Forest Centre

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