Beetles LIFE LIFE17NAT/FI/000181 Deliverable

Action A3: CWD Map for restoration plans

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Action A3, Deliverable 2

CWD map for restoration plans

Deliverable 2 is a map describing the distribution and amount of coarse woody debris (CWD) in Hiidenportti area. The amount and spatial distribution of CWD describe the ecological state of the forests and their value for the beetle species in focus. The CWD data can be used, e.g., when defining the crucial locations for area-level deadwood continuum and choosing the locations for artificial deadwood accumulation within this LIFE project.

The CWD map is presented in Fig 1. The estimated CWD volume is presented in 16 m x 16 m grid cells. The grid cell-level CWD estimates are based on direct detection of individual fallen trees using medium density airborne laser scanning (ALS) point clouds (15 points/m^2). The fallen trees were observed from ALS point clouds using an automatic detection method that relies on detecting line-like objects. The value of each 16 m x 16 m cell was determined by calculating the total volume of all observed fallen trees within the cell and dividing the volume with the area of the cell. Hence, the unit of each cell is m^3/ha. In Fig. 1, the color of each map cell is determined by the CWD volume within the cell. Red cells contain large amounts of CWD, yellow cells contain some CWD, and red cells contain a small amount or no CWD. A more detailed color classification can be found from the map legend. The CWD map is by no means exact, but rather an indicative representation of the CWD distribution in the Hiidenportti area. The value of a single map cell might differ significantly from the true amount of CWD in the corresponding area. Thus, the map should be interpreted as larger entities (e.g., at forest stand level) instead of looking at single cell values.

The automatic fallen tree detection method works best in old-growth forests with small height variations and a relatively small amount of undergrowth. Both the errors of omission and commission are the smallest in such areas, i.e., the proportion of observed fallen tree trunks is at its highest and the number false tree trunk observations is at its lowest. The accuracy of the detection method is significantly affected by the amount of undergrowth and other objects residing close to the ground. The method relies on distinguishing the fallen trees from such objects, which is often rather challenging. Therefore, dense undergrowth or ground vegetation layer, or a large amount of logging residue results in an overestimation of the CWD volume. Another factor impacting the accuracy of the tree trunk detection method is the slope of the terrain. Generating an accurate height model from areas with steep slopes or small-detailed height variations is challenging. The detection of fallen tree trunks relies on an accurate height model, as they mostly reside close to the ground. Thus, errors in the height model result in errors in fallen tree trunk observations. The two areas marked in red on the CWD map (Fig. 1) have recently undergone heavy thinning operations. During ALS data acquisition the areas contained large amounts of logging residues which resulted in a significant CWD volume overestimate. Thus, the cell values of the map do not represent true CWD amounts within these areas.

The illustrative CWD map presented in Fig.1 is also available as raster layer suitable for spatial analyses. The CWD raster layer is distributed upon request through Metsähallitus (www.metsa.fi/beetleslife).

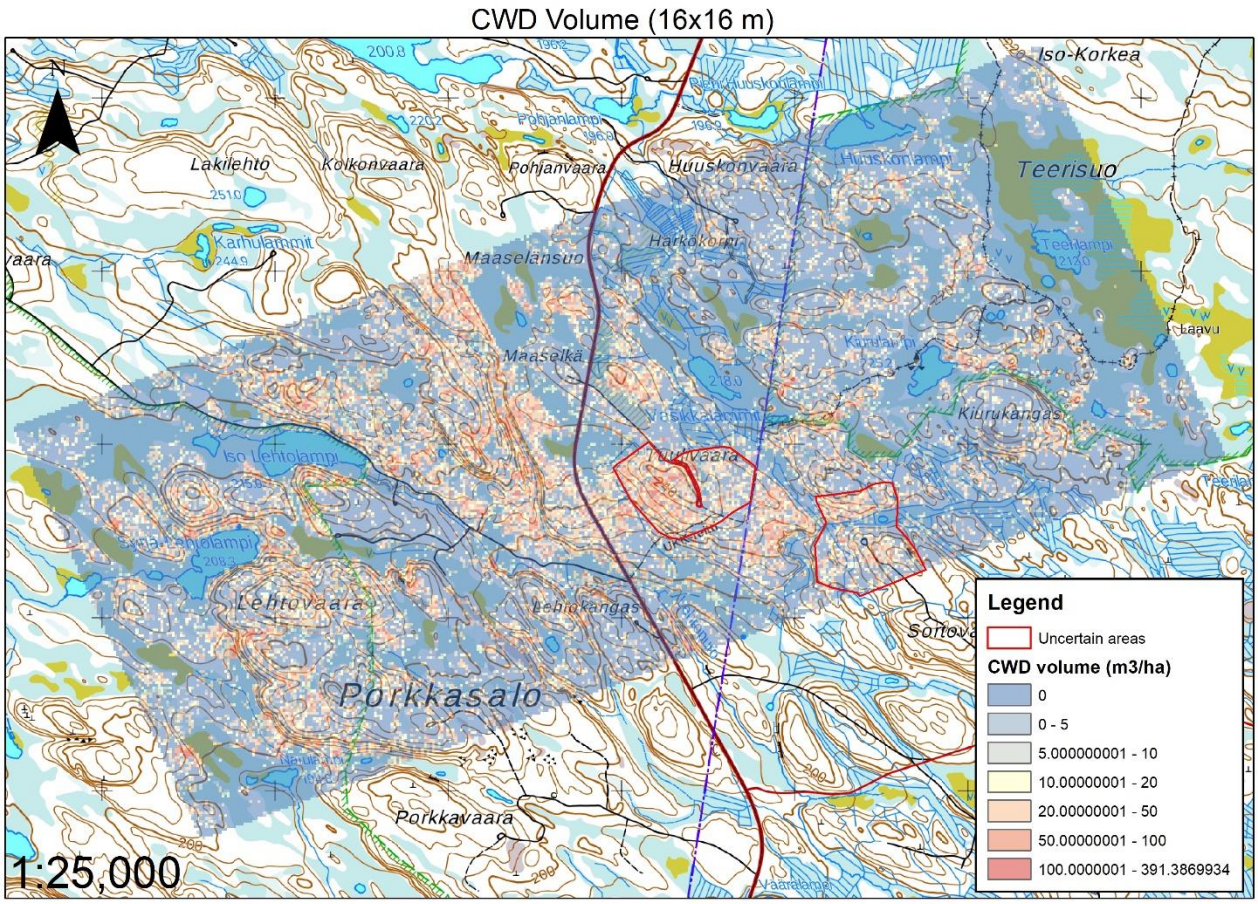

Fig 1. CWD map of Hiidenportti area.