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Using Remote Sensed Imagery to Determine the Impacts from Salvage Logging after the 2015 Tower Fire, Washington (USA)

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Wildfires are part of the natural process in most forested landscapes and during subsequent precipitation, the runoff and consequently erosion of the soil increases. Several factors contribute to the increased runoff: loss of runoff storage in the forest floor, the water repellent soil layer and reduced interception by the canopy. Due to climate change, the number of wildfires and their severity is likely to increase, which will lead to increased erosion; this has been investigated by others. Often, land management protocol is to remove the standing dead trees before they decay. In the past years salvage logging has received more attention in research, yet results have been mixed on its effects on increased erosion. The goal of the current research is to determine the change in surface conditions due to salvage logging operations by comparing the pre- and post-fire and post-salvage surface conditions. To determine this change, high resolution WorldView remote sensing imagery was used after 9000-ha 2015 Tower Fire which was located on the border of Idaho and Washington (USA). Ground validation measurements were taken using the forest soil disturbance protocol as well as GPS coordinates and measurements of highly disturbed areas such as skid trails, skyline drag lines and other machinery impacts. Some correlations were found between disturbance classes, bare soil, exposed wheel tracks (rutting) and soil compaction. High resolution WorldView remote sensing images detected changes in the pre- and post-fire environmental conditions and the change due to salvage logging operations. Classifying disturbances using remote sensing imagery is complicated by natural revegetation processes and by the timing of salvage logging operations. Initial results suggest that high resolution imagery can be used to determine onsite impacts of salvage logging operations.