

Using Quickbird Satellite Imagery for Post-wildfire Management and Research

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Timely and detailed information is essential after wildfires to enable managers to make informed decisions regarding post-fire ecological condition and if necessary, rehabilitation treatments. Post-fire assessment teams rely heavily on remotely sensed imagery to map the burned area, prescribe treatments and, increasingly, monitor vegetation recovery. Research has shown that conditions within the post-fire environment vary at a much finer spatial scale than the 30-m resolution of Landsat satellite imagery typically used for post-fire mapping. QuickBird satellite imagery, with 2-m resolution comparable to an aerial photograph, can be acquired within weeks after fire. We tested the application of QuickBird imagery for mapping initial burn severity and monitoring soil and vegetation response in treated areas after the 2005 School and the 2006 Tripod Fires, both in Washington state. Results suggest QuickBird imagery more accurately indicates unburned (green) and charred (black) areas, as compared to Landsat imagery. Fine-scale burn severity characteristics (e.g., individual trees, exposed soil patches, and small canopy openings) are clearly visible without any additional image analysis. The differenced Normalized Difference Vegetation Index (dNDVI) with QuickBird appears to be a reasonable substitute for the more commonly used Landsat index, the differenced Normalized Burn Ratio (dNBR), for mapping burn severity. We also successfully mapped patches of wheat and wood straw mulch which were applied for post-fire erosion control and then located them in the imagery. We are refining these methods for remote detection of vegetation patches, particularly invasive species. Spectral unmixing analysis of the QuickBird imagery predicted straw mulch cover on field plots with modest results ($r \sim 0.3$ to 0.5) and exposed soil with better results ($r \sim 0.4$ to 0.75). Both of these variables are important for soil erosion prediction, and these remote assessment techniques may improve both treatment prescriptions and post-fire monitoring.

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