

# Monitoring Ground Cover and Associated Erosion Risks Using Satellite Remote Sensing in the Agricultural Region of Western Australia

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National satellite-derived fractional ground cover products (percentage of green vegetation, dry vegetation, bare soil) are now routinely produced by Geoscience Australia and other groups, and are available for interpretation. The extensive coverage, frequent repeated observations and large archive of historical imagery supports more objective and reproducible methods than previous degradation monitoring efforts that were based on intermittent field surveys of land condition and anecdotal reporting. Landsat (30-m pixel resolution) seasonal composite images will be used to estimate total ground cover throughout the year, and assess the proportion of cropland in the grainbelt below recommended cover thresholds of 50% for wind erosion, and 70% for water erosion. Pixel on pixel calculations will identify consistently low cover areas, anomalies and changes through time. The results can be summarised at any scale, from regional to a property level. The algorithm was developed (and continually improved) by the Joint Remote Sensing Research Program in Queensland, and implemented on imagery in Geoscience Australia's Data Cube. In March/April 2019, 139 field sites were assessed for ground cover using the national standard discrete point transect sampling protocol. Initial assessment of agreement between the imagery and field data indicates a weak relationship ( $R^2$  0.47), the cause of which is still being investigated. The collection of field ground cover observations will allow the Department of Primary Industries and Regional Development, WA (DPIRD) to (a) provide a confidence measure when reporting on ground cover, (b) proportionally weight ground cover estimates on specific soil types or conditions to improve ground cover estimates, and (c) supply training sites for algorithm improvements. Farming practices to conserve topsoil are perceived to have reduced erosion over the last few decades, but every year erosion events still occur. Monitoring using remote sensing will provide DPIRD with valuable intelligence on ground cover and the risk of erosion. This will be reported directly to the agency's Dry Season Response team, regional groups, and the WA Soil and Land Conservation Commissioner to help direct resources to reduce erosion in the agricultural region. The autumn 2019 composite identified 12.2% of the grainbelt with less than 50% cover, compared to the 10 year average of 8.3%. This new DPIRD program will: Track land management trends that influence risk of water or wind erosion, and by inference, soil carbon changes; Identify areas at most risk from wind or water erosion after harvest (summer to autumn) to assist in targeting timely management recommendations; and Supply timely, relevant information for annual reporting to the state Soil and Land Commissioner and the WA Government.