

Coarse Woody Debris as a Reclamation Amendment in the Athabasca Oil Sands¹

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Abstract: Coarse Woody Debris (CWD) plays an essential role in boreal ecosystems. In both natural and anthropogenic ecosystems, CWD functions as an organic matter addition, source of nutrients, carbon store, fuel load, habitat for plants and animals, erosion control and alters water cycling. Incorporating CWD as a reclamation amendment may help in achieving some of these benefits on reclaimed sites. Reclamation cover soils in the mineable oil sands of northern Alberta, Canada, are mainly upland derived Forest Floor Mineral Mix (FFMM) and lowland derived Peat Mineral Mix (PMM). FFMM and PMM are considered a primary driver of successful reclamation effecting seedling establishment, moisture regimes, soil stability, nutrient availability and more. However, the impact of CWD may vary by soil type and by the amount of CWD applied. We analyzed the effects of CWD at a 6-year-old reclamation site that includes both FFMM and PMM soils on soil physical characteristics (bulk density, moisture, temperature) and the regenerating plant community (% cover, tree density, tree height). In general, cover soil is the major controller of ecosystem properties, but CWD does affect soil physical properties, in particular soil depth and bulk density. In preliminary findings soil depth was higher and bulk density was lower with the addition of CWD when compared to control sites. Bulk density appears to be higher above CWD on the hillslope. This likely reflects CWD acting as an erosion and compaction control barrier in these young reclamation sites. There does not appear to be any influence of CWD on other soil properties on the regenerating plant community at this early stage, but the long-term effects are not known.

Additional keywords: Soils, Regeneration, Mining.

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1. Poster presented at the 2022 National Meeting of the American Society of Reclamation Sciences, Duluth, MN. June 12-16, 2022. Published by ASRS; 1305 Weathervane Dr., Champaign, IL 61821.
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 3. Work reported here was conducted near 57° 23' 33.8748" N; -111° 37' 45.5874" W.