

## Deeper soil salvaging depths produce greater cover of native plants than shallow salvage depths on a reclaimed coal mine site

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### The Challenge

The forest understory serves as a key source of plant diversity and plays an important role in various forest processes. However, re-establishment of the forest understory community has proven challenging when using conventional reclamation techniques because of limited availability of native seed propagules.

To overcome some of these challenges, direct placement of forest floor material – where salvaged soils are transferred directly to a reclamation site – has been encouraged. This technique preserves native propagules in soils and can improve forest recovery. However, an important question remains: what soil salvage depth provides the greatest ecological benefit?

### The Approach

We sought to determine how native forest understory species responded to direct placement of forest floor material at two target depths. Material was salvaged from an aspen dominated forest. Target depths for salvage of suitable material were 15 cm and 40 cm and the material was directly transferred to a reclamation site with the same target placement depths of 15 cm and 40 cm. Vegetation surveys (percent cover of each species) were completed over the course of three years following reclamation of the site (i.e., 2010, 2011, 2012).

### The Results

Direct placement of forest floor material helped establish a diverse plant community including native forest understory species. The deeper soil salvage depth (40 cm) was better than the shallow salvage depth (15 cm) at establishing a forest understory plant community characteristic of the boreal forest.

The benefits of the deeper salvage and placement were clearest three years after reclamation. At this stage the 40 cm salvage depth contained forbs, shrubs and trees that were representative of a range of successional stages of boreal forests. In contrast, sites with the shallower 15 cm soil depth



**Fig. 1** Understory plant communities developing after direct placement of salvaged soil.

contained more competitive species that were only representative of early successional stages.

### Management Implications

- Direct placement of forest floor material can help native forest understory species establish on reclaimed sites, particularly in combination with a developing tree canopy
- Using deeper salvage depths (i.e., 40 cm vs 15 cm), where possible, helps less competitive native forest understory species to establish on the reclaimed site.
- Salvaging forest floor material at greater depth and then placing it more shallowly over larger areas could be effective in reducing costs and increasing restoration success.

### Further Reading

Macdonald, S.E., A.E.K. Snively, J.M. Fair, S.M. Landhäusser. 2015. Early trajectories of forest understory development on reclamation sites: influence of forest floor placement and a cover crop. *Restoration Ecology* 23:698-706.

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