CENTRE FOR BOREAL RESEARCH
TECHNICAL NOTE #31
FOREST RECLAMATION AND BOREAL REFORESTATION - DECEMBER 2019

COMPETITION CONSIDERATIONS WHEN USING SOIL STRIPPINGS FOR RECLAMATION OF INDUSTRIAL DISTURBANCES



INTRODUCTION

Industrial disturbances in northwest Alberta have been present in the landscape for decades. In recent years, operators have been working towards the reclamation, and ultimately, certification of these sites. Due to the age of these disturbances, there is immense variation in site conditions and challenges towards successful reclamation and reforestation of these sites. One challenge is aggressive colonization of agronomic vegetation, which out-competes desirable plant species (Figure 1). Sod-forming rhizomatous grasses (i.e. *Bromus inermis* [smooth brome], or *Festuca rubra* [creeping red fescue]) are of particular concern as they can preclude ingress of desirable native forest plant species.

Sod-forming grasses are often present on industrial sites either in the stockpiled topsoil or subsoil, as well as growing on the industrial site directly (Figure 1). In this last situation, a thick layer of sod can develop, forming an organic rich layer of decomposing roots and leaf matter.

As this sod (referred to as soil strippings) is often rich in organic matter, it is often separately stripped during reclamation activities and subsequently placed with the topsoil when earthworks are occurring. However, due to the presence of rhizomatous roots, there may be unintended consequences for subsequent forest development on these sites.

The intent of this technical note is to illustrate the short-term vegetation development effects of actively spreading soil strippings on recently reclaimed well sites. The study occurred on five decommissioned well sites located approximately 540 kilometres northwest of Edmonton, Alberta.

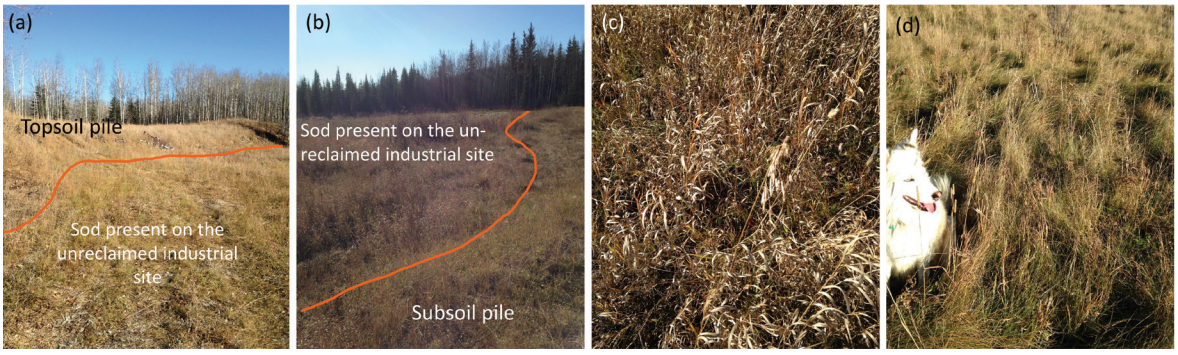


Figure 1. Examples of study sites prior to reclamation activities illustrating the presence of sod-forming grasses. (a-b) overview of two study sites with soil stockpiles and clear development of sod-forming grasses across the rest of the industrial site and, (c-d) close-up view of sod on these industrial sites.

SITE EARTHWORKS AND STUDY DESIGN

In late fall to early winter (November and December) the following was conducted:

- The existing layer of soil strippings that were present on the well sites were stripped and piled. The sites were re-contoured and subsoil was spread and then decompacted with ripper shanks.
- Following decompaction, topsoil was spread across the entire site and soil strippings were placed on 1/3 of the site (over the topsoil) (Figure 2).
- A final pass with ripper shanks was completed to create a rough and loose soil surface (Figure 3).
- White spruce *(Picea glauca)* seedlings were planted the summer (July) following earthworks.

Note: In this study, topsoil refers to the topsoil layer that was stockpiled adjacent to the site prior to site operations. Soil strippings refers to the 2-3 inch thick layer of grasses, forbs and some woody vegetation that had established during site operations.

Figure 2. Site post-earthworks with soil stripping placement.

Figure 3. Site post-earthworks without soil strippings.

RESULTS

Placement of soil strippings resulted in more than 40% cover of grasses (native and non-native) while the absence of soil strippings supported only 20% cover of grasses (Figure 4a and 4b). However, total vegetation cover was not different between the strippings treatments (Figure 4e) due to the conversely higher presence of native and non-native forbs when strippings were not placed (Figure 4c and 4d). The strippings-absent treatment also consistently resulted in higher woody vegetation densities (Figure 5a) for both trees (Figure 5b) and shrubs (Figure 5c).

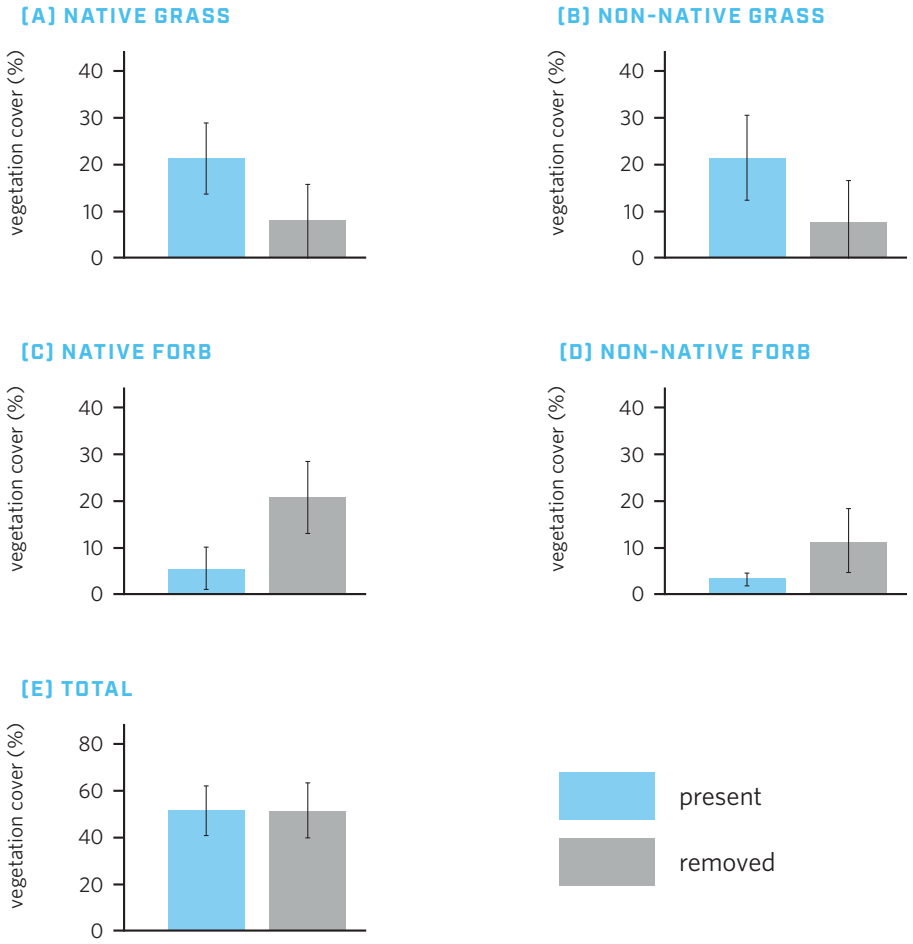
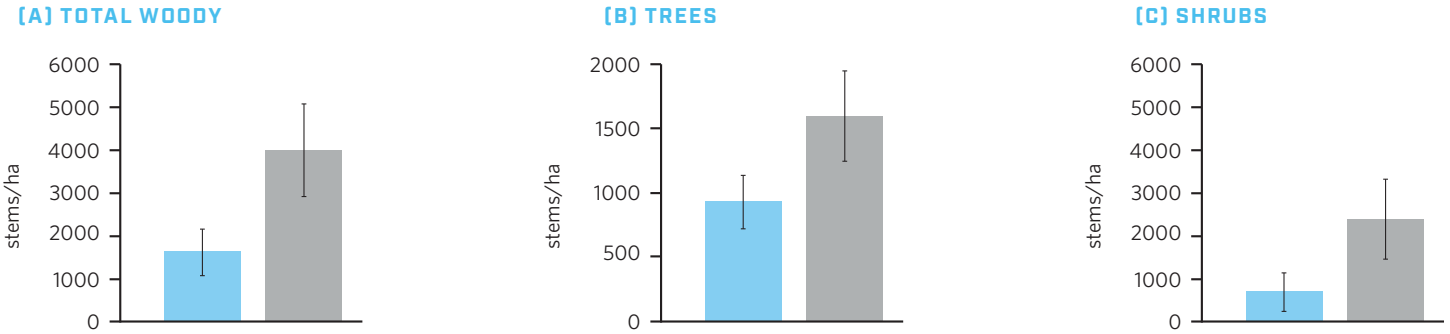


Figure 4 (right) Mean vegetation cover by vegetation cover category for all study sites, with strippings present or absent. Error bars indicate 95% confidence intervals on the mean (sample size = 6 study sites).

Figure 5 (below) Mean stem densities for (a) trees and shrubs (total woody), (b) trees and (c) shrubs for strippings present versus absent treatments. Error bars indicate 95% confidence intervals on the mean (sample size = 6 study sites).



CONCLUSIONS

Soil strippings contain organic matter and do have value in reclamation, however given the results observed, it is recommended to consider targeted placement (or potentially burial) of soil strippings in order to encourage the development of desirable forest vegetation. In this particular study, the consequences of placing strippings on the soil surface, allowing for a thick carpet of grasses to develop, was still visually apparent after five growing seasons following earthworks (Figure 6).

STRIPPINGS ABSENT

STRIPPINGS PRESENT (PLACED)

Figure 6. The effect of soil strippings placement five growing seasons after earthworks completion.

VISIT OUR WEBSITE
nait.ca/borealresearch
ISSN 2371-462X

CONTACT US
boreal@nait.ca
780.648.2600

AUTHORS
Amanda Schoonmaker and Catherine Brown. Centre for Boreal Research, NAIT.
Photo credits: Amanda Schoonmaker, Jeremy Dostie

Thank you to Natural Sciences and Engineering Research Council of Canada (NSERC) for financial support and Bonavista Energy for in-kind support.