

Impacts of Soil Stockpiling on Seed Viability and Vegetation Communities¹

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Abstract: Soil stockpiles will be essential to the reclamation of both large- and small-scale oil and gas sites in Alberta. The number of viable seeds is known to decline over time in soil stockpiles and be concentrated near the surface of both stockpiles and mature forest sites, but there is still uncertainty as to how long soils can be safely stockpiled before these declines start occurring, and to what depth most of the seed bank is stored. To test seed viability in soil stockpiles over time and with depth, we sampled eight stockpiles and six undisturbed forest sites around Fort McMurray and Cold Lake Alberta. Samples were taken from stockpiles aged from six months to older than 28 years old and from depths of 0-5, 5-10, 10-20, 20-30 and 80-90 cm. Samples were sieved, and 500 mL was measured and placed in a greenhouse on top of potting soil to allow seeds to germinate for 4 months. Most seeds germinated from the surface layer, with 92% of seeds germinating from the litter layer in the forested sites and 68% from the 0-5 cm layer in the stockpile sites. The stockpile ages that produced the most seedlings were 1.5, 5 and 7 years old. The 0.5-year-old stockpile produced the smallest number of seedlings (6 total, 0.6% of all stockpile seedlings). Aboveground vegetation was also sampled in June to compare the aboveground and belowground plant communities. We expect the seed bank community to differ from the aboveground community depending on the seed characteristics of different species. It is possible that seeds do not remain viable in stockpiles for a long period of time, and that they germinate on the surface in the first growing season after stockpiling. Therefore, using soil stockpiles for land reclamation in the future may be an issue because of the low number of viable seeds.³

Additional key words: seed bank, germination

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3. Work reported here was done near Fort McMurray (57.337779, 111.755247) and Cold Lake (54.695861, 110.730858) Alberta.