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MICROTOPOGRAPHIC PATTERNS IN TREATED AND UNTREATED SEISMIC LINES AND THEIR IMPLICATIONS FOR TREE RE-ESTABLISHMENT

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Project summary
It has been suggested that simplification of microtopography on seismic lines reduces tree regeneration by removing microsites for tree recruitment, especially in peatlands where lines are prone to flooding. The objectives of this study were to compare topography between seismic lines and adjacent forests and assess whether it affected patterns in forest regeneration. We hypothesized that the topography on seismic lines was simplified compared to adjacent natural stands and that these lines would have depressed elevations that lead to reductions in natural regeneration. Mounding treatments should therefore benefit natural regeneration and survival of planted trees, especially in treed fens due to the need to mitigate flooding. We used a ZIPLEVEL PRO-2000 High Precision Altimeter to measure the elevation profile (25 cm spacing) along the main seismic line axis and along its perpendicular profile in the Kirby experiment. Tree regeneration was measured within 1-m wide belt quadrats along these same transects. Mixed effect regression was used to assess differences among treatments (site as a random effect). Overall, we found a 10% decrease in topographic variation on untreated seismic lines compared to adjacent forests and more than a 3-fold increase on seismic lines that were mounded compared to untreated seismic lines. Regeneration was not related to topographic variation in control forests, while black spruce regeneration was related to topography in untreated seismic lines, but not other species. And finally, tree regeneration in treated seismic lines (mounded and planted) was positively related to topography in larch and aspen, but not black spruce.

Progress to date
In 2017, we assessed microtopography and tree regeneration at 113 paired sites (seismic vs. adjacent forest). This included 22-paired sites from the 2015 Kirby Lake treatment. Analyses are underway with initial reporting here of results for Kirby Lake. The next step will be analyzing differences across all sites, including responses to wildfire. A full report will be completed by April 15th 2018.

Management implications
Microtopography associated with artificial mounding has been shown to increase forest regeneration in reclaimed well pads in fens in northern Alberta. The lack of topographic variation on seismic lines likely affects the establishment of Sphagnum which has important implications to natural tree recruitment. One form of restoration now commonly used is to add microtopographic variability through artificial mounding, but more needs to be done to assess its effectiveness. This work provides insight into how effective mounding is and how these factors interact with tree recruitment and/or tree establishment for treated sites.

Geographic location
Sites sampled in 2017 were from the region between Cold Lake and Fort McKay with the Kirby Lake treatments south of Conklin the focus of this report.