Boreal Ecosystem Recovery & Assessment
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ECOLOGICAL TEAM FALL 2018:
FOREST RECOVERY AND TRAJECTORIES ON SEISMIC LINES

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Project summary

I have four objectives: (**1**) Quantify woody vegetation presence, density, and structure (including seedling and sapling stages) on seismic lines compared to adjacent stands; (**2**) Quantify growth rates (height/unit time) since last disturbance to predict recovery trajectories across the region; (**3**) Assess whether wildfire hastens recovery and how this may vary among forest types, local site conditions, and fire severity; and (**4**) Assess effectiveness of existing reclamation treatments (planting, mounding, etc.). This year we focused on changes in coarse woody debris post-fire and aspen upland sites. All field plots are based on 30-m long belt quadrats that quantify tree (2 m wide) and shrub (1 m wide) density, along with paired forest stand measures (basal area, tree density, stand height, stand age) in the adjacent forest.

Progress to date

In 2016 we sampled 70 sites (paired plots) on seismic lines within the Richardson fire of 2011 stratified to fire severity levels with a peer reviewed paper published. In 2017, 130 sites (paired plots) were sampled throughout northeastern Alberta within treed peatlands across a gradient of different fire severity (0 to 100%) and fire age (1995–2016) and an additional 140 sites (paired plots) sampled within different restoration treatments (Kirby, LiDea 1, LiDea 2). Both projects from 2017 have peer reviewed papers in preparation and ready for submission by the end of 2018. In the summer of 2018, 146 sites (paired plots) were sampled to address the last major forested ecosite - mesic uplands. Preliminary results suggest aspen recover quite well post-seismic-line creation and exceptionally well after fires. In 2018, we also revisited sites from 2016 to measure the amount of snag attrition and coarse woody debris (CWD) accumulation post-fire. Preliminary results suggest CWD accumulates at half the rate on seismic lines compared to forest controls and with basal area decreasing by 50% between 5- and 7-years post-fire. Additional work is being done on dendrochronology of regenerating trees on seismic lines to assess growth rates with to date 1800 samples (cookies) collected from 270 different seismic line sites.

Management implications

Results from this project will inform government and industry on where to focus reclamation efforts thus potentially saving reclamation costs by avoiding efforts where they are least effective or unnecessary. The examinations of fires suggest that natural recovery (passive restoration) of seismic lines should be expected post-fire for these sites. Restoration efforts here are not therefore needed if frequent fires are experienced or will at least provide seismic lines with an advantage of recovery over adjacent stands. Reclamation treatments in treed peatlands suggested that wetter ecosites, particularly rich fens, benefit most from mounding and planting. The application of coarse woody debris improved recovery in wetter, but not drier, ecosites. Focusing restoration efforts on rich fens may provide the best cost-benefit for forest recovery.

Geographic location

The study area stretches from Wandering River in the south to McClelland Lake in the north (area along Hwy 63) and from Conklin to Fort McMurray (area along Hwy 881) in northeastern Alberta.