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Application of EMEND Research Findings to the Oil Sands Industry

The Ecosystem Management Emulating Natural Disturbance (EMEND) Project, located near Peace River, Alberta, is a long-term, large-scale (1000 ha) variable retention harvest experiment. It is designed specifically to answer questions about how retaining various amounts and types of trees within a cut block affect harvest cost, forest regeneration, patterns of succession, biodiversity, nutrient cycling, ground water characteristics, and public perception, among other things.

Linear disturbance treatment - EMEND 1999 (Photo: Jim Witiw - DMI)

EMEND is a collaboration involving the Canadian Forest Service (CFS), University of Alberta, Alberta government, and forest companies, which began in 1998 and is forecasted to run for one stand rotation, or approximately 80–100 years (http://www.emendproject.org).

Anna Dabros, a CFS forest ecologist, is assessing how the knowledge generated by research findings at EMEND could be applied to help reclaim boreal forest sites disturbed by oil sands operations, and to mitigate future disturbances. “Ultimately, access to such baseline knowledge could help improve best management practices to reclaim, for example, in-situ oil sites, and help managers make informed decisions that would minimize the footprint of future disturbances and maximize the resilience potential of sites considered for future operations.”

EMEND results related to silvicultural practices may be of particular relevance for the oil and gas industry. This research covers work on site preparation to promote natural regeneration and replanting of affected areas.

Studies have been completed on biodiversity of understory vegetation and invertebrates, as well as nutrient cycling and ecosystem function and health. Scientists have also investigated effects of linear features (such as roads, pipelines, and seismic lines) on ecosystems.

EMEND research already comprises a significant contribution to the scientific literature on management of the boreal forest. That knowledge is now being accumulated for application to the oil and gas sector.

Researcher: Dr. Anna Dabros (Anna.Dabros@canada.ca)

Silvicultural Control of Armillaria Root Disease in Manitoba

Armillaria root disease, caused by the pathogen *Armillaria ostoyae*, is a serious problem during forest regeneration. Where the pathogen is present in stands prior to harvest, it is able to persist within the stumps left behind after logging. The pathogen then spreads from these infected stumps to kill seedlings that have been planted to establish the next rotation.

In 1992, Canadian Forest Service (CFS) researchers established a long-term trial in the Sandilands region of Manitoba to determine whether stump removal would reduce the impact of Armillaria root disease in the regenerating stand (Figure 1). Two species, jack pine (Pinus banksiana) and red pine (Pinus resinosa), were planted.

Fig. 1. Stump removal 1992 (Photo: T. Ramsfield)

Seedlings were planted into plots in which the stumps were removed or into plots where the stumps were left in the ground after harvest. The trial was assessed annually for the first 10 years and then at 20 and 21 years following establishment. Results showed a significantly high mortality rate if stumps were not removed prior to planting (Figure 2). When stumps were removed, there was an average 9% mortality rate, compared to an average 18% mortality rate when stumps were not removed.

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Small pine infected by Armillaria ostoyae (Photo: T. Ramsfield)

These results indicate that removing stumps as a site preparation treatment can reduce the impact of root disease in a regenerating stand.

Tod Ramsfield, the CFS researcher leading this trial adds, "Forest companies, which depend on maximizing the volume of their harvests per hectare, could benefit from these types of long-term research trials when planning their long-term rotations and harvests."

Researcher: Dr. Tod Ramsfield (Tod.Ramsfield@canada.ca)

Preparing for the Future with Lessons from the Past

Pine forests dominate the Chilcotin Plateau in the central interior region of British Columbia. These forests are currently subject to mixed to high-severity fires, as well as insect outbreaks, resulting in simple to complex stands. Were these forests and disturbance regimes always like this?

To examine how climate, vegetation, and fire disturbance changed through time, a team of researchers from the Canadian Forest Service led by Kendrick Brown collected sediment cores from two lakes located centrally on the plateau in 2011 and analyzed them for pollen, charcoal, and mollusc content.

Core Drilling 2011 (Photo: K. Brown)

However, the results also show that climatic conditions, warmer and drier than present, prevailed between 8,500 and 10,500 years ago. During that time, the plateau was different from its current state.

Compared to pine forests of today, sage-dominated, non-arboreal communities persisted on the plateau during this warm, dry interval. In addition, lake levels were lower and there were likely fewer of them. Consequently, a surface fire regime prevailed that was unlike the current fire regime.

“The results from computer modeling suggest that conditions suitable for open, sage-dominated communities may recur on the Chilcotin Plateau in the future, similar to the past", explains Brown, In other words, these two lines of independent evidence are converging on a similar conclusion – that the vegetation in this region has potential to change markedly in the future.

Using insights from the past, we further suggest that surface fires may become more common and water resources more restricted. This could have far-reaching implications for communities in this area, and the flora and fauna of the affected ecozones.”

Sediment core 2011 (Photo: K. Brown)

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Aussi en française

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