Data Article

Data on overstory and understory trees in aspen-dominated boreal mixedwood stands over 20 years after partial harvesting

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\textbf{A B S T R A C T}

Growing demand for non-timber forest ecosystem services has resulted in increased use of partial harvesting in boreal forests. Since the 1990s, multiple studies have yielded short-term responses to partial harvesting. Here we present an inventory of longer-term (20 years) responses of overstory and understory trees to partial harvesting in aspen-dominated boreal mixedwood stands. Pre- and post-harvesting overstory trees were mapped and measured for total height and diameter at breast height (DBH); understory trees were measured for total height. Codes identify tree species, treatments, and years since harvest. Data are stored in separate Microsoft Excel spreadsheets: overstory trees, understory trees, and years after harvesting.

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\textbf{Specifications Table}

| Subject area          | Forest ecology                                         |
|-----------------------|--------------------------------------------------------|
| More specific subject area | Tree inventory data                                |
| Type of data          | Table                                                  |
| How data was acquired | Field measurements                                     |

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Value of the data

- Overstory and understory tree data assessed at 0, 1, 3, 5, 11, and 20 years post-harvesting.
- Potential to analyze long-term dynamics of boreal forests following partial harvesting and forest tent caterpillar outbreaks.
- Opportunity to link short and long-term responses and assist resource managers in projecting long-term stand density, composition, and yield.
- Opportunity to study stand-scale mortality and ingrowth processes using mapped tree locations.

1. Data

The overstory and understory tree data presented here were the basis for the research article by Yang and Man [1] and the method documented by Man and Yang [2]. The raw data analyzed by Yang and Man [1] are available as Microsoft Excel spreadsheets in the Supplementary Material. An excerpt of the overstory data (Partial cut_Overstory) is shown in Table 1 and the understory data (Partial cut_Understory) in Table 2. Note: Each year’s data is stored in a separate worksheet. Previously reported post-harvesting data includes 5- and 11-year regeneration analyses [3,4] and 11-year responses of overstory trembling aspen to harvesting and forest tent caterpillar defoliation that occurred 3 to 5 years after harvesting [5].

2. Experimental design, materials and methods

Data presented here is from a partial harvesting experiment established in the early 1990s. The initial design was a randomized complete block with 4 harvesting treatments replicated 4 times. The study was originally designed to remove 0 (unharvested), 36 and 68% (partially harvested), and 100% (clearcut) of the merchantable overstory basal area (BA) of all trees ≥ 10 cm DBH. During application,

| Overstory plot | Section | Tree # | Species code | Distance (m) | Azimuth (°) | DBH (cm) | Height (m) | Survival code |
|----------------|---------|--------|--------------|--------------|-------------|-----------|-------------|----------------|
| 1              | 1       | 1      | 2            | 6.70         | 16.7        | 16.7      | 17.70       | 2              |
| 1              | 1       | 2      | 4            | 8.80         | 16.7        | 20.8      | 22.70       | 1              |
| 1              | 1       | 3      | 3            | 10.40        | 22.5        | 17.1      | 11.70       | 1              |
| 1              | 1       | 4      | 4            | 10.70        | 19.0        | 27.4      | 23.30       | 1              |
| 1              | 1       | 5      | 11           | 12.10        | 25.6        | 28.7      | 27.60       | 1              |
| 1              | 1       | 6      | 11           | 14.80        | 4.6         | 31.4      | 24.90       | 1              |
| 1              | 2       | 1      | 2            | 5.60         | 37.6        | 23.0      | 17.90       | 1              |

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however, the design was adjusted with the actual basal area removal approaching 40% for the partial harvesting treatments. Adjustments were necessary because of limiting operational site characteristics and the overarching need to protect advance conifer regeneration, resulting in 8 replications of 40% partial harvesting [3,6]. During January–February 1995, the 100 m × 100 m harvesting plots were full-tree logged with a feller-buncher and a grapple skidder. To achieve the 40% harvesting level, 20% of the overstory was removed, focusing on large trembling aspen and balsam fir in 16-m-wide leave strips plus 5-m-wide skid trails that were clear cut. To minimize machinery damage to residual trees, harvesting was done using careful logging techniques [6].

After harvesting, overstory plots, with a 25 m radius (0.2 ha) divided into 12 sections of 30 degree segments, were established in the centre of the 1-ha harvested area. Pre- and post-harvesting measurements included DBH and height for all tree species ≥ 4.0 m, survival status (live = 1 and dead = 2), as well as the location, distance and azimuth, of individual stems in relation to plot centre. On the circumference of the overstory plots, 12 equally spaced 2 m × 2 m understory plots were established. Within the understory plots, all tree species < 4.0 m were identified and measured for total height.

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.01.019.

Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.01.019.
References

[1] H. Yang, R. Man, Effects of partial harvesting on species and structural diversity in aspen-dominated boreal mixedwood stands, For. Ecol. Manage. 409 (2018) 653–659.

[2] R. Man, H. Yang, Construction of neighbourhood diversity indices with stem mapping data, Can. J. For. Res. 45 (2015) 1138–1142.

[3] G.B. MacDonald, M.L. Cherry, D.J. Thompson, Effect of harvest intensity on development of natural regeneration and shrubs in an Ontario boreal mixedwood stand, For. Ecol. Manage. 189 (2004) 207–222.

[4] R. Man, G.J. Kayahara, J.A. Rice, G.B. MacDonald, Eleven-year responses of a boreal mixedwood stand to partial harvesting: light, vegetation, and regeneration dynamics, For. Ecol. Manage. 255 (2008) 697–706.

[5] R. Man, G.J. Kayahara, J.A. Rice, G.B. MacDonald, Response of trembling aspen to partial cutting and subsequent forest tent caterpillar defoliation in a boreal mixedwood stand in northeastern Ontario, Canada, Can. J. For. Res. 38 (2008) 1349–1356.

[6] G.B. MacDonald, Harvesting Boreal Mixedwood Stands to Favour Conifer Regeneration: Project Establishment and Early Results, Ont. Min. Nat. Resour., Ont. For. Res. Inst., For. Res. Rep., Sault Ste. Marie, ON 157 (2000).