# Supporting Information

Héon et al. 10.1073/pnas.1409316111

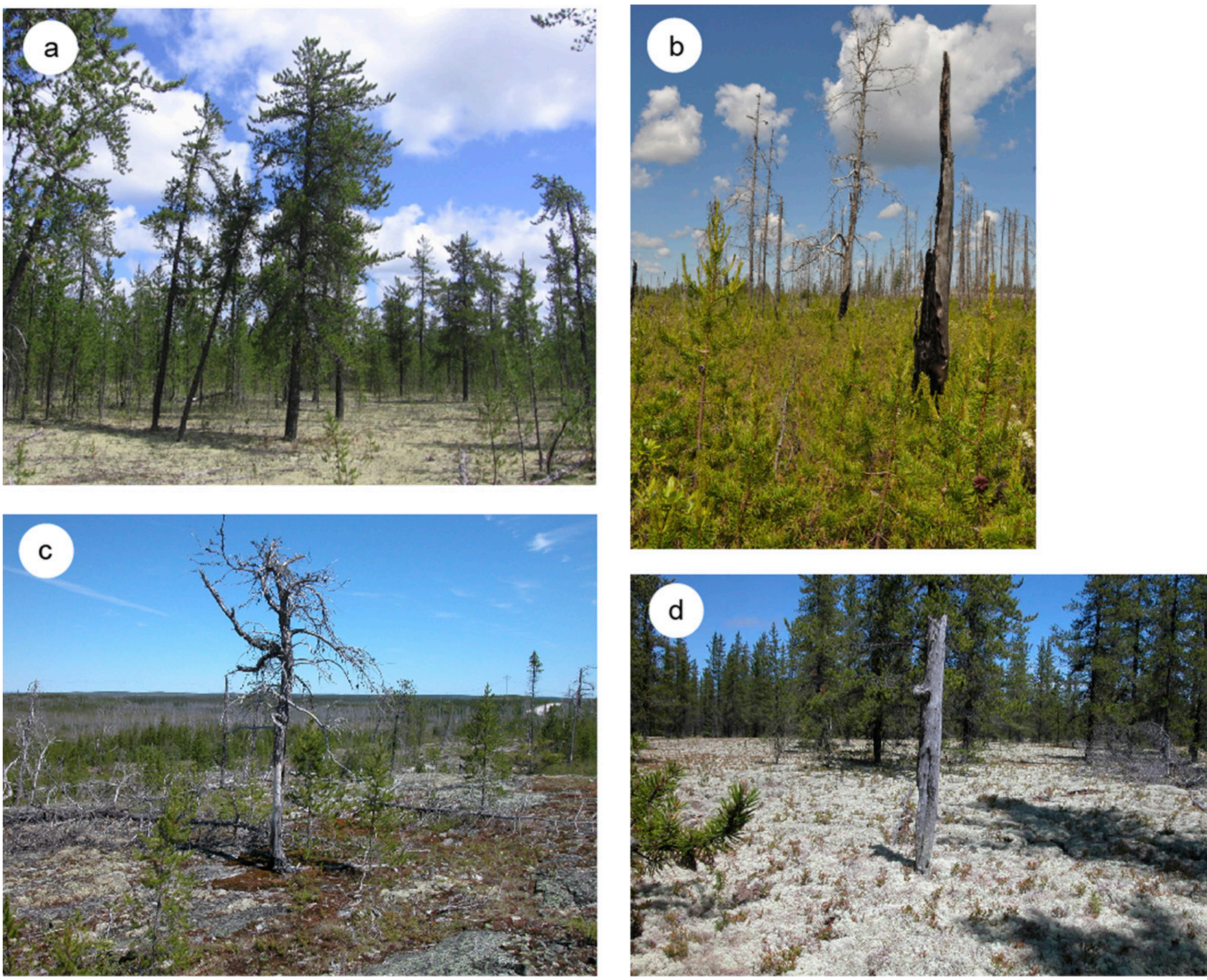


**Fig. S1.** Representative fire-scarred trees sampled in the 2 $km^2$ cells. (*A*) A group of fire-scarred pine trees (foreground) within a younger even-aged stand (background). (*B*) Two scarred pine snags (multiple scars) within a regenerating pine stand. (*C*) A pine snag with multiple scars (1882 and 1941) on a rocky outcrop. This specimen died during the last fire in 1989. (*D*) An ancient fire-scarred pine snag in cell 8. The corresponding individual established after the 1708 fire and was scarred by the 1791 fire. It was then killed by the 1872 or 1882 fires and was charred by the 1941 fire. The surrounding even-aged stand established after the last fire in 1941.

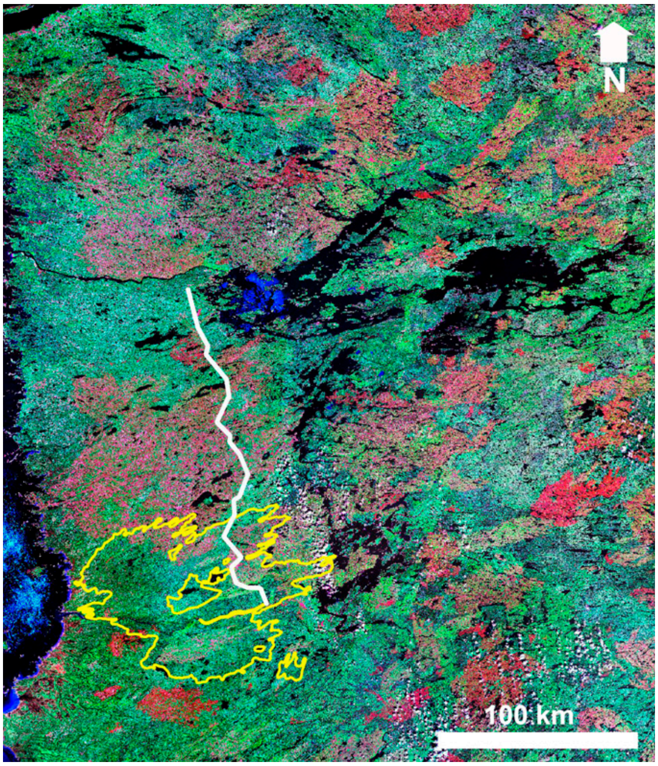


**Fig. S2.** Land Remote Sensing Satellite (LANDSAT) Enhanced Thematic Mapper mosaic showing the importance of very large fires (areas in orange and red) in the study area. Scenes within the mosaic where acquired between 1999 and 2002. The oldest discernible fires occurred during the early 1980s; thus, all fires displayed occurred during an interval of about 20 y. The large fire scar intersected by the studied transect (*white line*) comprises two distinct 1989 fire polygons that together constitute the second largest polygon (6,596 km$^2$) recorded in Canada between 1980 and 2010 (of 10,398 polygons ≥200 ha after merging adjacent polygons of the same years) (26). The yellow outline encloses the 2013 fire, which was the third largest fire (5Z830 km$^2$) recorded in Canada since 1980. LANDSAT data are available from the US Geological Survey.

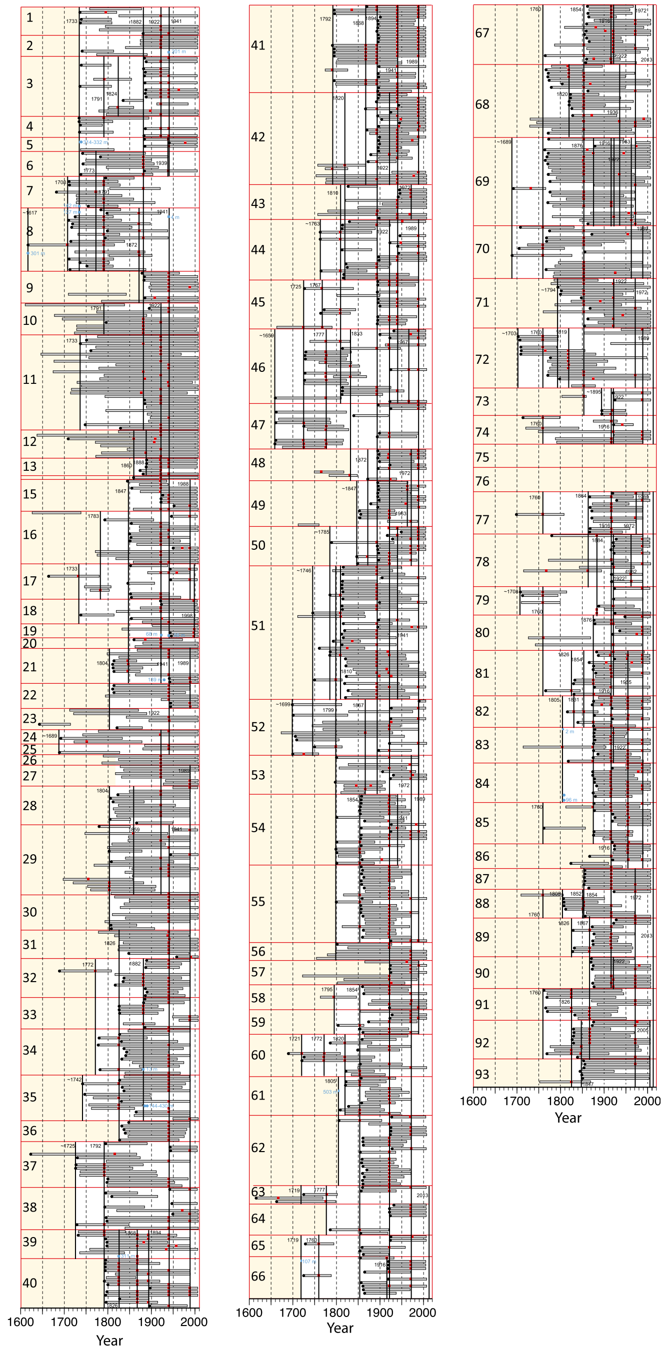


**Fig. S3.** Reconstruction of the length of overlapping fires from fire scars and first tree rings sampled in the 93 cells along the road transect. Cells are numbered to the left and are separated by horizontal red lines. Solid vertical lines represent the extent of fires across cells. Gray bars represent the periods of all cross-dated snags, woody debris, and live trees. Filled black circles refer to corrected years of first tree ring in pine trees with pith taken at less than 1 m above the root collar in individuals with an attached stump. Filled red squares indicate fire scars in pine or spruce trees. Blue circles and squares indicate first tree rings and fire scars in trees found at less than 500 m outside cells (shortest distance to the corresponding cell indicated alongside with symbols). The yellow shading indicates the period of cell inactivity before the first valid fire date in each cell. The vertical scale is arbitrary. All data displayed are included in Dataset S1 except the 2013 fire (cells 63–93), which occurred after the field campaign and was mapped from LANDSAT images.

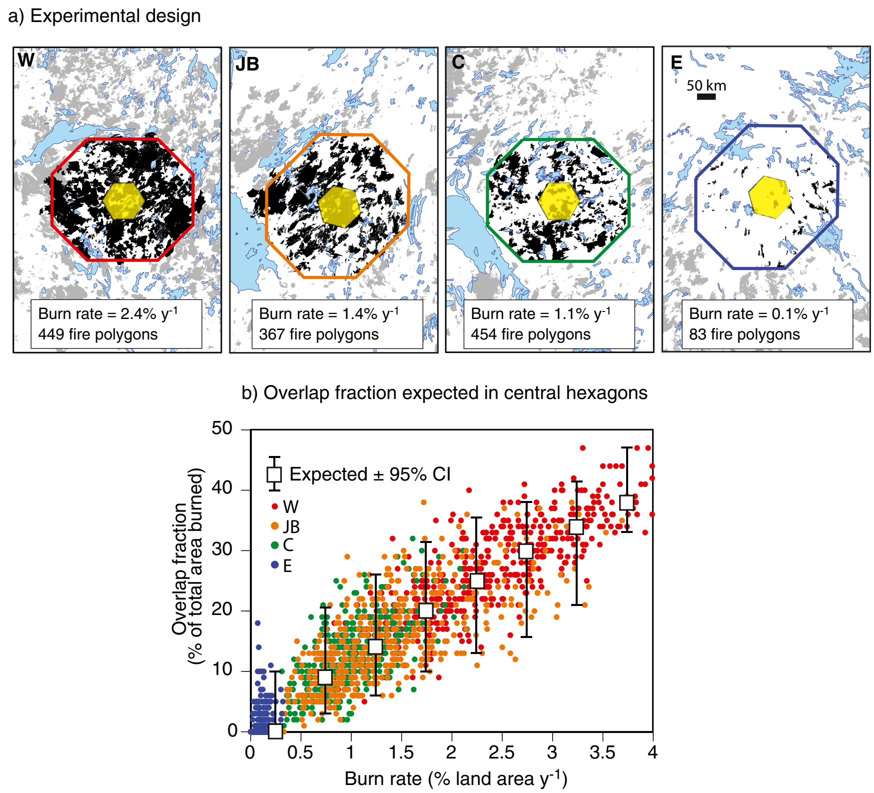


**Fig. S4.** Permutations of fire polygon centroids to test the null hypothesis that new fires occur at random relative to previous fires. The upper panels (*A*) display actual fire polygons (1980–2010) within the four octagons shown in Fig. 5*A* (*black*, fire polygons with centroid inside octagon; *gray*, polygons with centroid outside octagon), as well as the central hexagonal cell of each octagon (*semitransparent yellow*). Combining the 2,000 random permutations of fire polygon centroids from the four octagons allowed us to estimate the overlap fraction expected inside an hexagonal cell under a given burn rate, along with its 95% confidence interval (*B*). W, C, JB, and E refer to octagon locations (West, Central, James Bay, East).

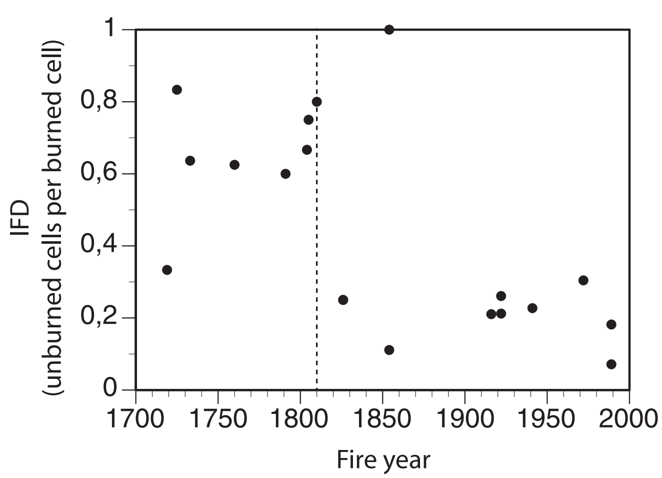


**Fig. S5.** Index of fire discontinuity (IFD) as a function of fire year. The IFD is the ratio of the number of unburned cells to the number of detected burned cells for fire years with a discontinuous series of burned cells. The vertical dashed line separates the 1700–1810 and 1811–1989 periods. The IFD suggests that our ability to detect a fire that spread across a cell has remained relatively constant during the last 200 y.

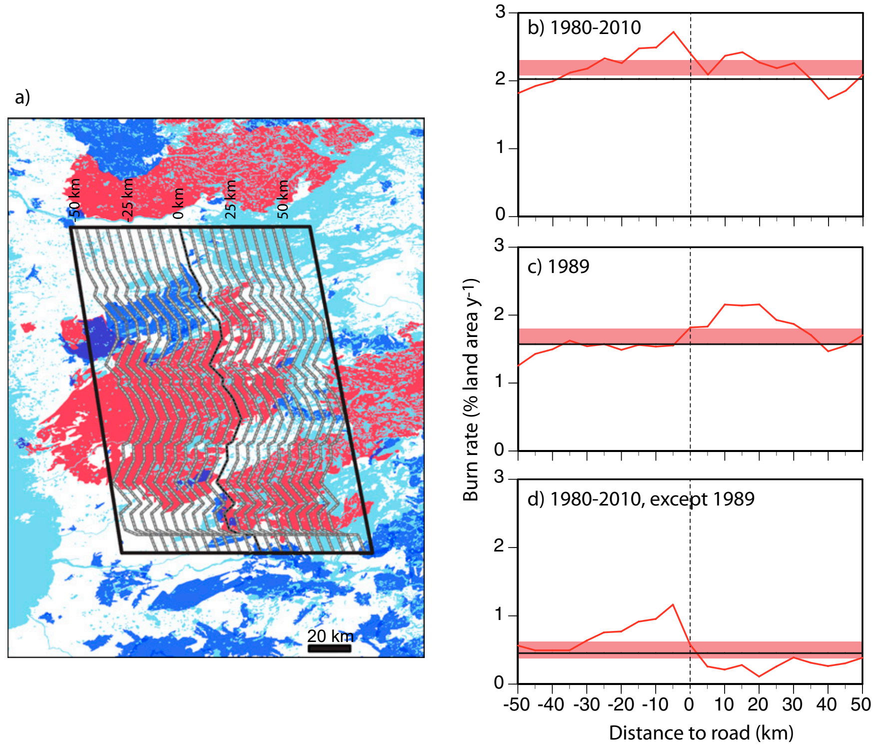


**Fig. S6.** Spatial variability of linear burn rates and comparison with rates computed from the surface area of fire polygons. (*A*) Fire polygons of the Canadian National Fire Database for the 1980–2010 period (26) relative to transects positioned at 5-km distance intervals (*gray*) from the actual road location (*black*; *red*, 1989 fires; *semitransparent blue*, all other fire years). (*B*–*D*) Linear burn rates (*red solid line*) are compared with the overall burn rate (*black solid line*), calculated from the surface area of fire polygons inside the parallelogram delineated by the thick black line in *A* as well as with the 95% confidence interval of the mean burn rate computed from the 21 systematically spaced transects (*horizontal red band*). We excluded large water bodies and considered separately all fire years (*B*), only the extreme fire year of 1989 (*C*), and all years except 1989 (*D*). Linear burn rates measured along the actual road path (vertical dashed line) tend to be at the center of the range of variability in the longitudinal axis, suggesting no methodological bias associated with the road location. In addition, linear burn rates computed for the diverse transect positions vary around the overall burn rate computed from the surface area of fire polygons over the region. As a consequence, as our linear burn rates for the last two centuries (Fig. 2*B*) were computed for even longer intervals of 50 y, they were considered comparable to rates that would have been computed from the surface area of fire polygons.

**Table S1. Frequency and dominance of tree species at points systematically located every 200 m along the transect**

| | Frequency, %* | | | | | Dominance, %* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TSF, y | N points | Pima | Piba | Lala | Potr | Pima | Piba | Lala | Potr | Shrub |
| <20 | 194 | 65.0 | 67.0 | 19.7 | 5.4 | 38.1 | 53.6 | 4.1 | 1.0 | 3.1 |
| >20 | 242 | 87.3 | 53.3 | 41.4 | 4.1 | 59.9 | 33.1 | 2.5 | 1.7 | 2.9 |

See Fig. 4. Points are separated into two groups of similar sizes according to the time since the last fire (TSF). Balsam fir [*Abies balsamea* (L.) Mill.] and paper birch (*Betula papyrifera* Marsh.) also occur sporadically along the transect but were not present at the sampling points. Pima, *Picea mariana*; Piba, *Pinus banksiana*; Lala, *Larix laricina*; Potr, *Populus tremuloides*; Shrub, sites dominated by dense shrubs of the *Alnus* or *Salix* genera.

*Taxa frequency is the percentage of sampled points at which the corresponding taxa is present; taxa dominance is the percentage of points at which the taxa is dominant, based on density of stems more than 1 m high, which was evaluated in circular plots with a radius varying between 5 and 10 m, depending on stem density.

**Table S2. Data loss backward in time**

| Period | Active cells, % | Fire years, n | Burned cells, n | Burned segments, n |
|---|---|---|---|---|
| 1950–2013 | 100 | 11 | 126 | 22 |
| 1900–1949 | 99.2 | 5 | 124 | 24 |
| 1850–1899 | 95.0 | 14 | 86 | 22 |
| 1800–1849 | 78.6 | 10 | 53 | 22 |
| 1750–1799 | 45.0 | 13 | 54 | 24 |
| 1700–1749 | 20.0 | 7 | 27 | 13 |
| 1650–1699 | 2.3 | 3 | 7 | 4 |
| Total | — | 63 | 477 | 131 |

A segment is a series of adjacent 2 × 1 km cells burned during a given fire year. See Fig. 1 and Fig. S3 for the spatiotemporal representation of segments.

## Other Supporting Information Files

Dataset S1 (XLS)