Supplementary Information

**Table S1.** Summary information for study by Adams & Boyle (1980) [1].

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| **Information type** | **Article summary** |
| *Location:* | Roscommon County, MI |
| *Forest Type:* | Oak-aspen |
| *Fire Type:* | Wildfire (May) following clearcut or whole tree chipping |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1975 |
| *Time between last fire and sampling (years):* | 0, 1 |
| *Fire behavior information:* | Variable fire intensity categorized as "light" or "moderate" |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Post-harvest, pre- and post-wildfire |
| *Soil type:* | Sandy (Udipsamments) |
| *Sampling Depth:* | 0–24 cm; lysimeters at 20 cm and 60 cm |
| *Soil variables measured:* | Mineral soil total N, available Ca, Mg, K and P;  soil solution Ca, Mg and K |
| *Response:* | Ca, Mg, K and P increased one month following wildfire in both harvest treatments, and decreased to pre-burn levels five months after wildfire; Ca leaching increased in the clearcut site following wildfire. |
| *Other information:* | Soils were sampled in June and October following wildfire; lysimeter data were collected in 1975 and 1976 |

**Table S2.** Summary information for study by Adams & Boyle (1982) [2].

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| **Information type** | **Article summary** |
| *Location:* | Roscommon County, MI |
| *Forest Type:* | Oak-aspen |
| *Fire Type:* | Wildfire (May) following clearcut or whole tree chipping |
| *Chronosequence or other long-term measurements?* | Soils data presented for immediately post-fire, and one and  five years post-fire |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1975 |
| *Time between last fire and sampling (years):* | 0, 1, 5 |
| *Fire behavior information:* | Authors cite Adams & Boyle (1980) |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Post-harvest, pre- and post-wildfire |
| *Soil type:* | Sandy (Udipsamments) |
| *Sampling Depth:* | 0–24 cm |
| *Soil variables measured:* | Total N, extractable P, Ca, Mg, and K |
| *Response:* | Post-wildfire nutrient increases were greater in the clearcut site than in whole-tree harvest. Wildfire increased soil Ca and P at four years post-fire. |

**Table S3.** Summary information for study by Ahlgren (1959) [3].

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| **Information type** | **Article summary** |
| *Location:* | Heart Lake, Superior National Forest, MN |
| *Forest Type:* | Unspecified forest type within a matrix of natural and planted jack pine, spruce-fir, aspen and black spruce, and unforested land |
| *Fire Type:* | Wildfire (Spring) |
| *Chronosequence or other long-term measurements?* | Soils data presented for unburned control areas and two post-fire measurement periods spanning five years |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | 4 mo; 5 y |
| *Fire behavior information:* | Fast-moving wildfire causing some scorching of tree crowns; fire lingered in some areas. Fire consumed all forest floor material and some humus. |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned forest |
| *Soil type:* | Loamy sand to sand |
| *Sampling Depth:* | 0–2.5 cm, 2.5–5.1 cm, 5.1–17.8 cm, 17.8–48.3 cm |
| *Soil variables measured:* | Available N, NH4, Ca, P, K, pH |
| *Response:* | Nutrient concentrations in upper soil from a burned area are greater than those in an unburned control four months after fire, and the difference from the control diminishes over time. |
| *Other information:* | This study focuses on vegetative response to wild- and prescribed fires using 350 plots established on 1000 acres in the Superior National Forest. General location, fire type and acreage are given. |

**Table S4.** Summary information for study by Ahlgren & Ahlgren (1965) [4].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | Repeated measurements over three years |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1961, 1963 (separate plots) |
| *Time between last fire and sampling (years):* | 0–2 for 1961 burn; 0 for 1963 burn |

**Table S4.** *Cont.*

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Fire behavior information:* | Backing fires |
| *Fire Temperature:* | Maximum temperature in 1961 was 482 C with 200 C temperatures sustained for 20 min; maximum temperature in 1963 was >482 C. |
| *Experimental control or pre/post measurements:* | Uncut and unburned control, and cut and unburned control |
| *Soil type:* | Sandy loam |
| *Sampling Depth:* | Level 1: surface inch of soil; Level 2: transition between humus and mineral soil; each level was sampled to 1–1/18 in |
| *Soil variables measured:* | Bacteria, fungi, streptomycetes, soil respiration |
| *Response:* | Microbial numbers and activity were reduced by burning but increased following rainfall. Minor effects remained evident in the third growing season following fire. |
| *Other information:* | This study presents the first assessment of soil microbial properties following fire in Minnesota jack pine forests |

**Table S5.** Summary information for study by Ahlgren (1970) [5].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Bearskin Lake, Grass Lake and Dragon Lake, Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire (summer) following clearcut or seed tree harvest |
| *Chronosequence or other long-term measurements?* | Repeated measurements including pre-fire and three years post-fire |
| *Reported number of fires within study area:* | 2 (1 wildfire 70 years before study; 1 prescribed fire used for study) |
| *Year(s) of fires:* | 1961 (Bearskin Lake); 1963 (Grass Lake); 1967 (Dragon Lake) |
| *Time between last fire and sampling (years):* | 70 |
| *Fire behavior information:* | Backing fires with rate of spread was < 1.5 m/min; authors present fire weather information |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Uncut and unburned control (70-y mature stand) and cut and unburned control |
| *Soil type:* | Loamy sand |
| *Sampling Depth:* | Surface 3 cm (Level 1), 3–6 cm transition between humus and mineral soil (Level 2), and mineral soil to 25 cm (Level 3) |
| *Soil variables measured:* | Soil temperature during burning; Soil moisture content, soil reaction, dispersible silt and clay, organic matter, total N, available P and K, exchangeable Ca, Mg |
| *Response:* | Maximum soil surface temperatures during fires ranged from 149 C to 816 C. Organic soil was reduced by 30% to 100% by fire. Burning increased soil pH and nutrienct concentrations in Level 1. Authors present monthly soil moisture data for one burned site and controls for 1961–1963. |
| *Other information:* | Prescribed burns were conducted in early to mid-summer (late May or early June) to maximize Hazel control |

**Table S6.** Summary information for study by Ahlgren (1979) [6].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire following seed-tree harvest |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1961 |
| *Time between last fire and sampling (years):* | 12 |
| *Fire behavior information:* | Burning reduced litter depth by 60%–75% relative to pre-burn depth |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Uncut and unburned control, and cut and unburned control |
| *Soil type:* | Not specified |
| *Sampling Depth:* | 0–2.5 cm |
| *Soil variables measured:* | Number of seeds/ha |
| *Response:* | Soil from cut-unburned and cut-burned sites contained twice as much seed as in uncut-unburned sites. |

**Table S7.** Summary information for study by Ahlgren (1981) [7].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | Repeated measurements between 1961–1977 |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1961 |
| *Time between last fire and sampling (years):* | 0–17 |
| *Fire behavior information:* | No; but see Ahlgren & Ahlgren (1965) |
| *Fire Temperature:* | See Ahlgren & Ahlgren (1965) |
| *Experimental control or pre/post measurements:* | Uncut and unburned control (70-y mature stand) |
| *Soil type:* | No information given; but see Ahlgren & Ahlgren (1965) |
| *Sampling Depth:* | Soil surface, interface between humus and mineral soil, and 5 cm into mineral soil |
| *Soil variables measured:* | Temperature |
| *Response:* | Greater temperature extremes (max, min) were observed at the soil surface in the burned area than in the control for seven growing seasons post-fire. Maximum soil surface temperatures became lower in the burned area than in the control 8–10 y post-fire, and this effect corresponded with shrub layer development. Differences between burned and control areas diminished over time. |

**Table S8.** Summary information for study by Alban (1977) [8].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Minnesota |
| *Forest Type:* | Red pine |
| *Fire Type:* | Prescribed fire following forest thinning |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Multiple: prescribed fire treatments included annual, biennial and periodic (every 6–9 y) frequencies between 1960–1969 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | 2–26 mo |
| *Fire behavior information:* | Backing and headfires were used. Fires were conducted in spring or summer following rainfall and when forest floor moisture content was 100% or 40%, respectively. |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control plots |
| *Soil type:* | Loamy sand (Cutfoot soil series; weakly developed) |
| *Sampling Depth:* | Forest floor (L, F, H layers); mineral soil 0–4 in, 4–20 in, and 20–39 in |
| *Soil variables measured:* | pH, organic matter, N, P, K, Ca, Mg for forest floor and mineral soil; percent clay and cation exchange capacity for mineral soil |
| *Response:* | Detailed results are presented for forest floor and mineral soil for each of the spring and summer annual, bienniel and periodic fire treatments and the control. |
| *Other information:* | The full text of this publication is available online. |

**Table S9.** Summary information for study by Anderson (1982) [9].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Seney National Wildlife Refuge, MI |
| *Forest Type:* | Various |
| *Fire Type:* | Wildfire (Summer) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1976 |
| *Time between last fire and sampling (years):* | 3 |
| *Fire behavior information:* | Detailed fire progression information |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned controls for each vegetation type |
| *Soil type:* | Matrix of sand knolls and organic soils |
| *Sampling Depth:* | Mineral A-1, A-2, B |
| *Soil variables measured:* | Litter decomposition (in transition between 0–1 and 0–2 horizons), pH, changeable H and Al, changeable bases, available P, organic matter, N |
| *Response:* | Litter decomposition was greater in burned plots than unburned plots after two weeks, but there were no differences after eight weeks. In general, fire did not affect mineral soil chemical properties. |

**Table S10.** Summary information for study by Beaudry *et al*. (1997) [10].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Frontier Lake Experiment Research Plots of the Petawawa National Forestry Institute, Chalk River, ON |
| *Forest Type:* | Mixed pine |
| *Fire Type:* | Prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Several; most recent prior to the study was 1943 slash fire |
| *Year(s) of fires:* | 1991 (June–August) |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | Fire intensities ranged from 450 to 20,000 kW/m |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Yes; this study provides comparisons among clearcut, clearcut followed by scarification or prescribed fire, and undisturbed control sites. |
| *Soil type:* | Fine sand (Humo-ferric podzols) |
| *Sampling Depth:* | Soil surface (pitfall traps) |
| *Soil variables measured:* | Carabid beetle species diversity, richness and number of catches |
| *Response:* | Both types of disturbance (scarification, and clearcut and burned) increased carabid diversity, richness and number of catches relative to control sites. Clearcut and burning had greater impact on Carabid beetle assemblages than scarification. |

**Table S11.** Summary information for study by Bedison *et al*. (2010) [11].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Adirondack Mountains, NY |
| *Forest Type:* | Northern hardwood and white pine or red pine |
| *Fire Type:* | Unknown |
| *Chronosequence or other long-term measurements?* | Repeated measurements over a 75-y time period |
| *Reported number of fires within study area:* | Unknown |
| *Year(s) of fires:* | Unknown |
| *Time between last fire and sampling (years):* | Unknown |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No control; this study uses 54 permanent vegetation plots in three forest types (including subalpine spruce-fir, not summarized here) |
| *Soil type:* | Well-drained (Spodosols, Inceptisols and Histosols) |
| *Sampling Depth:* | Oe, Oa and mineral horizons (1930–1932 and 1984); Oe, Oa and mineral soil 0–10 cm, 10–20 cm and 20+ cm |
| *Soil variables measured:* | Organic matter content |
| *Response:* | Sixteen of the 29 northern hardwood or pine-dominated forest sites showed evidence of past fire. In these sites, soil organic matter increased between 1932 and 2005/2006 in the whole soil profile at an average rate of 0.5 Mg/ha/y. When these forest types were analyzed separately, the increase was not statistically significant for pine-dominated stands, whereas the increase for northern hardwood stands was marginally significant. |

**Table S12.** Summary information for study by Bradford *et al*. (2012) [12].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire (Ham Lake) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 2007 (May) |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Control plots in forest with no recent disturbance |
| *Soil type:* | Shallow soils (but see summary table for Fraver *et al*. 2011) |
| *Sampling Depth:* | Forest floor; mineral soil to 10 cm |
| *Soil variables measured:* | C content |
| *Response:* | Forest floor C pool was significantly reduced in the Blowdown + Logging + Fire treatment relative to the Control and Blowdown treatments. There was no difference in forest floor C between the Fire, Blowdown + Fire, and Blowdown + Logging + Fire treatments. There were no differences in mineral soil C pools among any of the treatments. |
| *Other information:* | This study provides comparisons of ecosystem C pools and total ecosystem C among wind disturbance, wildfire disturbance and their combination, with and without salvage logging. |

**Table S13.** Summary information for study by Buckman (1964) [13].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Chippewa National Forest, MN |
| *Forest Type:* | Red pine |
| *Fire Type:* | Prescribed fire conducted in one or two times in a three-year period |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1–2 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | 0–3 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control |
| *Soil type:* | Not specified |
| *Sampling Depth:* | Humus (L, F and H layers) |
| *Soil variables measured:* | Pre-fire humus moisture content, post-fire humus depth and weight |
| *Response:* | Humus moisture content is greater in spring than in summer. Summer fires result in greater reduction in humus depth and weight. Results are presented for prescribed fire season and timing. |
| *Other information:* | This study focuses on prescribed fire season and frequency for hazel control under red pine, and presents ancillary data on humus reduction from the Cutfoot Experimental Forest site. |

**Table S14.** Summary information for study by Dickie *et al*. (2009) [14].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Science Ecosystem Reserve and Long Term Ecological Research site, MN |
| *Forest Type:* | Oak savanna and forest |
| *Fire Type:* | Prescribed fire (Spring) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Repeated burns since 1964. Number of fires/years was 9/10 for two research plots and 2/3 for one plot |
| *Year(s) of fires:* | Authors cite Tester (1996) and Reich *et al*. (2001) |
| *Time between last fire and sampling (years):* | Not reported |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Prescribed fire savanna sites compared to forest sites not treated with fire since 1964 |
| *Soil type:* | Not specified |
| *Sampling Depth:* | 0–20 cm |
| *Soil variables measured:* | Ectomycorrhizal fungal diversity |
| *Response:* | Mycorrhizal communities differed between savanna and forest plots, whereas there was no difference in total fungal community diversity. |

**Table S15.** Summary information for study by Dijkstra *et al*. (2006) [15].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak savanna |
| *Fire Type:* | Prescribed fire (Spring) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Fire frequency of 0.84 fires/y since 1964 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Not reported |
| *Fire behavior information:* | Low intensity with flame lengths <1 m |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Prescribed fire savanna site compared to forest site not treated with fire since 1964 |
| *Soil type:* | Sandy (Typic and Alfic Udipsamments) |
| *Sampling Depth:* | 0–15 cm |
| *Soil variables measured:* | In situ N mineralization, ex situ potential net N mineralization, losses of N via leaching and burning, aboveground litter N, root N concentration |
| *Response:* | Oak-dominated patches had greater N mineralization than grass-dominated patches in savanna, in spite of greater N losses through burning and leaching. Total soil N did not differ between patch types. Following tree death, N mineralization near oak trees declines within five years to levels similar to grass-dominated patches. |

**Table S16.** Summary information for study by Duchesne & Weber (1993) [16].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Frontier Lake experimental site near Petawawa Research Station, Chalk River, ON |
| *Forest Type:* | Mixed pine |
| *Fire Type:* | Prescribed fire in standing timber |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Multiple fires prior to prescribed fire applied in standing timber |
| *Year(s) of fires:* | 1990 (September) |
| *Time between last fire and sampling (years):* | 8 months |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Adjacent unburned forest |
| *Soil type:* | Fine-grained sand (Humo-ferric Podzol) |
| *Sampling Depth:* | n/a (Authors observed aboveground ascocarps) |
| *Soil variables measured:* | Morchella conica ascocarps |
| *Response:* | Large numbers of Morchella conica ascocarps were observed in a 2–3 m radius around dead jack pine trees, but not around dead white or red pine trees, in sites treated with prescribed fire. No ascocarps were observed in adjacent unburned forest. |

**Table S17.** Summary information for study by Duchesne & Wetzel (1999) [17].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Frontier Lake, near Petawawa Research Station, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Several wildfires determined from dendrochronological studies; most recent prior to the study was in 1943 |
| *Year(s) of fires:* | 1991 |
| *Time between last fire and sampling (years):* | 1–3 |
| *Fire behavior information:* | Authors cite McAlpine (1995) for information on the Canadian Forest Fire Weather Index conditions for the suite of prescribed fires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Yes; this study provides comparisons among clearcut, clearcut followed by scarification or prescribed fire, and undisturbed control sites. |
| *Soil type:* | Sand (Humo-ferric Podzols) |
| *Sampling Depth:* | Newly senesced forest litter for jack pine, red oak, trembling aspen, and bracken fern |
| *Soil variables measured:* | Litter decomposition rate |
| *Response:* | Among-treatment differences were more common after one year of incubation than after three years of incubation, indicating that the effect of disturbance on forest litter decomposition diminishes over time. |

**Table S18.** Summary information for study by Fraver *et al*. (2011) [18].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Gunflint Corridor of the Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire (Ham Lake) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 2007 (May) |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No control; this study provides comparisons among Blowdown-Salvage-Fire, Blowdown-Fire and Fire-only disturbances |
| *Soil type:* | Glacial tills, outwash and lacustrine deposits |
| *Sampling Depth:* | Forest floor |
| *Soil variables measured:* | Fire severity |
| *Response:* | Greater fire severity occurred in the Blowdown-Salvage-Fire treatment than in Blowdown-Fire or Fire-only. Forest floor material was charred but not completely consumed even in the highest severity class. |

**Table S19.** Summary information for study by Gough *et al*. (2007) [19].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | University of Michigan Biological Station, Pellston, MI |
| *Forest Type:* | Northern hardwood |
| *Fire Type:* | Prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | 68-y chronosequence |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1936, 1948, 1954, 1980, 1998 |
| *Time between last fire and sampling (years):* | 68, 56, 50, 24, 6 |
| *Fire behavior information:* | Slash was evenly distributed to promote fire spread |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Nearby untreated reference stand |
| *Soil type:* | Sand (Entic Haplorthods) |
| *Sampling Depth:* | Organic horizon; mineral soil to 80 cm (in 20 cm increments) |
| *Soil variables measured:* | C concentration, mineral soil C mass, soil respiration (total, O-horizon, and mineral soil) , annual change in C |
| *Response:* | Organic soil C increased in stands up to age 40. Mineral soil C mass to 20 cm declined between young and intermediate age stands and increased between intermediate and older stand ages; however, there was no effect of age at greater depth. Soil respiration increased with stand age. Annual soil respiratory flux increased over 50 years by 60%. Effects of forest harvesting and fire on mineral soil C are evident at shallow depths only. Organic soil C pool is related to leaf litter production. |

**Table S20.** Summary information for study by Grigal *et al*. (1977) [20].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Little Sioux Fire, Boundary Waters Canoe Area Wilderness, MN |
| *Forest Type:* | Mixed conifer |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Three-year litter decomposition study |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1971 (May) |
| *Time between last fire and sampling (years):* | Periodically for three years |
| *Fire behavior information:* | Fire consumed upper 2–3 cm (L layer) but the lower 2–3 cm (F and H layers) were not consumed |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Adjacent, unburned virgin forest |
| *Soil type:* | Texture varies across study area (Inceptisols, Entisols) |
| *Sampling Depth:* | Forest floor surface |
| *Soil variables measured:* | Litter decomposition rate (aspen; aster), litter concentrations of ash, N, Ca, Mg, P, and K |
| *Response:* | Decomposition rates did not differ between burned and unburned forests for aspen or aster litter. Litter had greater ash, N, P, and K concentrations in burned forest and greater Ca concentration in unburned forest. |

**Table S21.** Summary information for study by Hernandez & Hobbie (2008) [21].

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| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak savanna and forest |
| *Fire Type:* | Prescribed fire (Spring) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | This study used sites representing high (>0.80 fires/y) and medium (0.33–0.50 fires/y) fire frequency since 1964 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Not reported |
| *Fire behavior information:* | Low intensity; typically not hot enough to consume the entire litter layer |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | High burn frequency and medium burn frequency sites compared to forest sites unburned since 1964 |
| *Soil type:* | Sandy (Typic and Alfic Udipsamments) |
| *Sampling Depth:* | Litter layer; mineral soil at 10 cm |
| *Soil variables measured:* | Mineral soil N and P availability, litter layer moisture content, temperature, C, N and P concentrations, microbial biomass |
| *Response:* | High fire frequency reduced soil N and P availability and litter moisture. Litter decomposition and N dynamics were predicted by litter C:N ratio, which increased with fire frequency. No relationship existed between microbial biomass and litter N dynamics. Authors conclude that fire has an indirect effect on N dynamics through direct effects on litter characteristics. |

**Table S22.** Summary information for study by Herr *et al*. (1994) [22].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Near Petawawa National Forestry Institute, Chalk River, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1991 |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | Fire Weather Index, fire intensity and fuel consumption are provided for each burned plot; fires were headfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Clearcut and unburned controls |
| *Soil type:* | No information given |
| *Sampling Depth:* | Rhizosphere |
| *Soil variables measured:* | Ectomycorrhizal colonization of planted seedlings |
| *Response:* | This study evaluated ectomycorrhizal colonization of two-year old white and red pine seedlings planted in burned and unburned clearcut jack pine sites.Percent of roots with ectomycorrhizae was positively correlated with fire intensity for white pine but not red pine. Fewer lateral roots per unit length of primary or secondary roots were observed in red pine planted in burned sites than in unburned sites. |

**Table S23.** Summary information for study by Johnston & Elliott (1998) [23].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Black Sturgeon Mixedwood Research Project, near Thunder Bay, ON |
| *Forest Type:* | Boreal mixedwood |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1996 (May) |
| *Time between last fire and sampling (years):* | 0 |
| *Fire behavior information:* | Detailed fire weather information are presented. Head fire rate of spread was 2–7 m/min; frontal fire intensity was 2000 to 10,000 kW/min. |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Burned but uncut control |
| *Soil type:* | No information given |
| *Sampling Depth:* | Forest floor or ash layer; mineral soil 0–10 cm |
| *Soil variables measured:* | Ash, forest floor and mineral soil pH, total N and P, extractable, total or exchangeable Na, Mg, Ca, and K; organic matter in forest floor and mineral soil |
| *Response:* | All harvested stands resulted in greater forest floor reduction than uncut stands. Ash pH and P concentrations were greater in uncut stands than in harvested stands. Whole-tree harvest resulted in greater forest floor P and forest floor and mineral soil pH. |
| *Other information:* | This study compares fire effects on soil in stands representing a suite of harvesting treatments designed to create fires of varying severity. Forest floor depth was measured before and immediately after the fire. Ash samples were taken within 24 hours of the fire. Forest floor and mineral soil samples were taken three months after the fire. |

**Table S24.** Summary information for study by Kay *et al*. (2008) [24].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak savanna |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | Not reported |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Not reported |
| *Fire behavior information:* | All fires were low-intensity spring burns |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned controls |
| *Soil type:* | No information given |
| *Sampling Depth:* | Litter (oak leaves collected after abcission) |
| *Soil variables measured:* | Litter decomposition rate over 1.5 y |
| *Response:* | There were no differences in the effects of lace bug herbivory on bur oak litter chemistry or decomposition between burned and unburned sites. |
| *Other information:* | This study evaluated the interactions between insect herbivory and fire on litter chemistry (measured within 24 hours of leaf abcission) and litter decomposition. Burned sites supported greater herbivory by lace bugs, whereas unburned sites supported greater herbivory by aphids, indicating an interaction between fire and insect herbivory. |

**Table S25.** Summary information for study by Kemball *et al*. (2006) [25].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Lac Seul Upland ecoregion, Boreal Shield ecozone, southeastern MB |
| *Forest Type:* | Boreal mixedwood |
| *Fire Type:* | Wildfire (Black River Fire) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1999 (May) |
| *Time between last fire and sampling (years):* | 0, 1 |
| *Fire behavior information:* | See authors citation of Wang (2002) for detailed fire weather behavior |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; data evaluated among severely burned, lightly burned or scorched stands (determined from fire impact on forest floor) |
| *Soil type:* | Clay |
| *Sampling Depth:* | 1999: Forest floor or ash; mineral soil 0–10 cm |
| *Soil variables measured:* | Soil moisture, pH, forest floor or ash depth; soil moisture measured in field in 2001 |
| *Response:* | The "organic horizon" in severely burned stands was ash. Forest floor depth and % moisture in organic and mineral horizons was lower in severely burned stands than lightly burned or scorched stands, whereas pH was greater. In 2001, there were no differences in soil moisture among stands. |
| *Other information:* | This publication focused on seedling germination but reported data on soil and forest floor conditions. |

**Table S26.** Summary information for study by Knighton (1977) [26].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Coulee Experimental Forest, near La Crosse, WI |
| *Forest Type:* | Oak-hickory |
| *Fire Type:* | Prescribed fire (Spring) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 3 |
| *Year(s) of fires:* | 1971, 1972, 1973 |
| *Time between last fire and sampling (years):* | 0 |
| *Fire behavior information:* | Light to moderate intensity headfires; fire spread rate ranged between 1.2–3.0 m/min |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control |
| *Soil type:* | Silt loam (Typic Hapludalfs) |
| *Sampling Depth:* | Organic soil, and mineral soil 0–4.4 cm, 0–2.5 cm and 2.6–5.0 cm; lysimeters at 15 cm |
| *Soil variables measured:* | Vacant pore space, moisture content, bulk density, water permeability, particle size, organic C; soil water PO4, Kjeldahl-N, (NO3 + NO2)-N, Ca, Mg, K, and Na |
| *Response:* | Fire had no effect on physical soil properties. Fire caused minor increases in anion and cation concentrations in soil leachate. |

**Table S27.** Summary information for study by Kruger & Reich (1997) [27].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Southwestern WI |
| *Forest Type:* | Mesic hardwood |
| *Fire Type:* | Prescribed fire (Spring) in forest opening |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 2 |
| *Year(s) of fires:* | 1989, 1990 |
| *Time between last fire and sampling (years):* | 0, 1 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control in opening |
| *Soil type:* | Not specified |
| *Sampling Depth:* | 0–20 cm |
| *Soil variables measured:* | Net N mineralization, extractable NO3 and NH4, soil moisture content |
| *Response:* | Extractable NO3 was greater in the burn treatment than in the control in 1990 |
| *Other information:* | This study focused on leaf gas exchange, N concentration and water status in hardwood regeneration but presented supplementary data on soil N availability and mineralization rate |

**Table S28.** Summary information for study by LeDuc & Rothstein (2007) [28].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Highplains district of northern lower peninsula, MI |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1998, 1999, 2000, 2001 (one stand burned in each year) |
| *Time between last fire and sampling (years):* | Three to six years |
| *Fire behavior information:* | Stand-replacing wildfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Comparison data from mature jack pine stands are presented |
| *Soil type:* | Poorly-developed sands (Typic Udipsamments) |
| *Sampling Depth:* | Oa + mineral soil to 10 cm |
| *Soil variables measured:* | Bulk density, total soil C and N, potentially mineralizable C and N fractions, extractable phenolics, pH, microbial biomass C and N, gross N mineralization and nitrification, available base cations, extractable P |
| *Response:* | Wildfire reduced soil N, microbial biomass C and N, and potentially mineralizable C and N relative to mature stands |

**Table S29.** Summary information for study by LeDuc & Rothstein (2010) [29].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Highplains district of northern lower peninsula, MI |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Yes |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1945, 1950, 1959, 1966, 1983, 1987, 1990, 1995, 1999, 2001 |
| *Time between last fire and sampling (years):* | 4–60 years |
| *Fire behavior information:* | Stand-replacing wildfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides data from a chronosequence of time since fire |
| *Soil type:* | Sandy (Typic Udipsamments) |
| *Sampling Depth:* | Oe + mineral soil to 10 cm |
| *Soil variables measured:* | Percent silt+clay, soil pH, base cations (Ca, Mg, K), available P, total C and N, total soil proteins, total soluble N, mineral N, total free amino-acid N, and microbial amino-acid consumption |
| *Response:* | Amino-acid N increased with stand age, whereas mineral N was greater in the youngest and oldest stands than in stands of intermediate age. Authors suggest that organic N may be important source of N during stand development stages when tree growth and N uptake are greatest. |

**Table S30.** Summary information for study by Lynham *et al*. (1998) [30].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Sharpsand Creek, near Thessalon, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | Repeated measurements over a 10-y time period |
| *Reported number of fires within study area:* | 2 |
| *Year(s) of fires:* | 1975 or 1976 prescribed fire implemented in 1948 wildfire site |
| *Time between last fire and sampling (years):* | 1, 2, 10 |
| *Fire behavior information:* | Fire intensity, depth of burn, and depth of burn class (low or high) are given for each burned plot |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | "Pre-burn" soil samples collected from unburned plots in 1975 |
| *Soil type:* | Sand (Humo-ferric Podzols) |
| *Sampling Depth:* | Organic layer; mineral soil 0–5 cm and 5–10 cm |
| *Soil variables measured:* | pH, total N, exchangeable Ca, K and Mg, extractable P |
| *Response:* | Fire increased soil pH in organic and mineral soil, and organic soil pH remained elevated 10 y post-fire. Fire increased mineral soil Ca and Mg for 2 years and N, P and K for 10 years. |

**Table S31.** Summary information for study by McColl & Grigal (1975) [31].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Dogfish Lake and Meander Lake watersheds, Little Sioux Fire, Boundary Waters Canoe Area Wilderness, MN |
| *Forest Type:* | Mixed conifer |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1971 (May) |
| *Time between last fire and sampling (years):* | 0–2 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned watershed (Dogfish Lake) |
| *Soil type:* | Sandy loam (Dystrochrepts) |
| *Sampling Depth:* | Under forest floor or in mineral soil at various depths between 15 cm to 75 cm, depending on soil depth |
| *Soil variables measured:* | Total and relative amounts of P in overland flow and soil water; volume of overland flow and soil water |
| *Response:* | Fire increased P in overland flow in 1971 and increased overland flow volume in 1972; P concentration was reduced in 1972–73. Soil water volume increased in 1971 and P increase peaked in 1972. Authors suggest that rapid revegetation following the spring fire ameliorated nutrient losses to lakes and streams. |

**Table S32.** Summary information for study by McColl & Grigal (1977) [32].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Dogfish Lake, Meander Lake, and Lamb Lake watersheds, Little Sioux Fire, Boundary Waters Canoe Area Wilderness, MN |
| *Forest Type:* | Mixed conifer |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1971 (May) |
| *Time between last fire and sampling (years):* | 0–2 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned watershed (Dogfish Lake) |
| *Soil type:* | Sandy loam (Dystrochrepts) in Meander Lake (burned) and Dogfish Lake (unburned) watersheds; sandy loam to silty loam (Eutochrepts) in Lamb Lake (burned) watershed |
| *Sampling Depth:* | Under forest floor or in mineral soil at various depths between 15 cm to 75 cm, depending on soil depth and presence of stones or boulders |
| *Soil variables measured:* | Concentrations of Ca, Mg, K, total P and N, nitrate-N, and pH of overland flow and soil water |
| *Response:* | Differences in nutrient concentrations in overland flow water between burned and unburned watersheds decreased over time. Nutrient concentrations in soil water decreased in burned watersheds across three years post-fire, and this was attributed to an increase in soil water. Higher nutrient concentrations were observed in one burned watershed relative to the unburned control; authors suggest that an interaction exists between fire and soil parent material. |

**Table S33.** Summary information for study by Mitchell *et al*. 2012 [33].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire (Ham Lake) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 2007 (May) |
| *Time between last fire and sampling (years):* | 1 year for disturbed plots; 2 years for control plots |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Control |
| *Soil type:* | Stony sandy loam |
| *Sampling Depth:* | Forest floor (Litter/Oi layer and duff/Oe + Oa layer); mineral soil to 10 cm or bedrock |
| *Soil variables measured:* | Mercury pools and concentrations in forest floor and mineral soil |
| *Response:* | There was no effect of fire alone on mineral soil Hg concentrations or pools in mineral soil or forest floor layers. |

**Table S34.** Summary information for study by Noble *et al*. (1977) [34].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Superior National Forest, MN and Quetico Provincial Park, ON |
| *Forest Type:* | Jack pine and black spruce |
| *Fire Type:* | Wildfire and post-logging prescribed slash burn |
| *Chronosequence or other long-term measurements?* | Data from sites disturbed in 1961 and sites disturbed in 1971 |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1961 or 1971 |
| *Time between last fire and sampling (years):* | Not specified; study conducted in early/mid-1970s |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned adjacent virgin forest |
| *Soil type:* | No information given |
| *Sampling Depth:* | Forest floor; mineral soil 0–9.2 cm and 9.2–18.4 |
| *Soil variables measured:* | Particle size distribution, percent organic matter, conductivity, pH, available P, total N, replaceable Ca, Mg, K, Na |
| *Response:* | The 1961 wildfire and slash burn sites show similar characteristics to undisturbed sites, indicating that short-term effects of fire diminish with time since disturbance. |

**Table S35.** Summary information for study by Norris & Reich (2009) [35].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak savanna and forest |
| *Fire Type:* | Prescribed fire (Spring) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | This study used sites representing high (>0.80 fires/y), intermediate (0.33–0.50 fires/y) and low (0–0.11 fires/y) fire frequency since 1964 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Not reported |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No control; this study presented data from areas of high, intermediate and low fire frequency |
| *Soil type:* | Sandy (Entisols) |
| *Sampling Depth:* | 0–20 cm |
| *Soil variables measured:* | Total soil N, mineral N, net N mineralization, soil water |
| *Response:* | Net N mineralization was greater in the low fire frequency than intermediate or high fire frequency treatments, and mineral N was greater in the low frequency than high frequency treatment. |
| *Other information:* | This study focused on plant resportion efficiency and proficiency but presented previously unpublished soil data as site description information in Methods |

**Table S36.** Summary information for study by Ohmann & Grigal (1979) [36].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Little Sioux Fire, Boundary Waters Canoe Area Wilderness, MN |
| *Forest Type:* | Mixed conifer |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1971 (May) |
| *Time between last fire and sampling (years):* | 1, 3 |
| *Fire behavior information:* | Provides detailed fire weather, fire spread information. Fire was mixed intensity and few areas existed in which organic materal was consumed to expose mineral soil. Fire intensity is reported for each stand. |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control |
| *Soil type:* | Coarse-textured till and fine-textured lacustrine deposits (Udipsamments, Eutrochrepts, and Dystrochrepts) |
| *Sampling Depth:* | Forest floor; mineral soil A and B horizons (depths vary and are presented by authors); mineral soil to 150 cm or bedrock |
| *Soil variables measured:* | Forest floor mass, mineral soil bulk density, C content, N, total P, available P, exchangeable bases (Ca, Mg, K, Na), acidity, pH, exchangeable H and Al; soil texture |
| *Response:* | Results are presented and discussed for 7 individual stands. There were no significant changes in pH, exchangeable bases, and total P between 1972 and 1974 measurements. |
| *Other information:* | Fire occurred in slash and budworm-killed fir that remained following logging in formerly mixed-conifer forest; pre-fire forest composition is given for each stand. |

**Table S37.** Summary information for study by Reeder & Jurgenson (1979) [37].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Various locations in the Upper Peninsula, MI |
| *Forest Type:* | Hardwood, conifer; study included grass-dominated, non-forest sites |
| *Fire Type:* | Prescribed- and wildfire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1974, 1975 |
| *Time between last fire and sampling (years):* | 0 |
| *Fire behavior information:* | Fire intensity of 1975 fires was categorized as light, medium or severe burn using characteristics of remaining litter |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned controls: mature stands of pure white pine, jack pine, red pine, eastern hemlock, red oak, sugar maple, white spruce, balsam fir, and white birch |
| *Soil type:* | Burned sites: sand to clay loam; Unburned control sites: sand to loamy sand |
| *Sampling Depth:* | Mineral soil 0–5 cm, 5–10 cm, 10–15 cm, |
| *Soil variables measured:* | Water repellency of soil |
| *Response:* | Water repellency occurred in 40% of fire sites and was positively related to estimated fire intensity. Water repellency occurred more frequently on aspen-dominated sites than in other forest forest types; however, it also occurred in soils from unburned aspen sites. |
| *Other information:* | For all fires, water repellency measurements were taken within 4 weeks following fire. Specific fire locations were not reported. |

**Table S38.** Summary information for study by Reich *et al*. (2001) [38].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Northeastern MN |
| *Forest Type:* | Boreal (Aspen, jack pine, black spruce forests) |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire using young and old fire-origin stands |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Not specified, but ages of fire-origin and logging-origin stands are given |
| *Time between last fire and sampling (years):* | Approximately 30 y for "young" age class and 77–98 y for "old" age class for each of the three forest types |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | For each forest type, stands originating after logging are compared to stands originating after fire |
| *Soil type:* | Sandy (taxonomy not specified) |
| *Sampling Depth:* | Organic soil, mineral soil 0–20 cm for N mineralization and 0–30 cm for other soil analyses |
| *Soil variables measured:* | Organic soil total P, K, Ca, Mg, Al, Mn, Fe, Na, Zn, Cu, B, Pb, Ni, Cr, Cd; litter percent N; mineral soil pH, cation exchange capacity, percent base saturation, K, Ca, Mg, percent C, soil texture (percent sand, silt and clay), in situ N mineralization |
| *Response:* | N mineralization did not differ between fire-origin and logging-origin stands across all forest types. Post-fire jack pine stands tended to have lesser percent soil C than post-logging stands, whereas the opposite pattern occurred for aspen stands. |
| *Other information:* | This study compared vascular plant and bryophyte species diversity between forest stands that originated following stand-replacing wildfire with those that originated following a clearcut. Soils data are presented for all forest types and ages. |

**Table S39.** Summary information for study by Reich *et al*. (2001) [39].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak savanna and forest |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | Prescribed burning experiment begun in 1964 |
| *Reported number of fires within study area:* | Not reported; fire frequencies of 0 to 0.81 fires/y |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Not specified |
| *Fire behavior information:* | Low intensity headfires with flame lengths <1 m |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No defined control; this study provides data from stands representing a range of fire frequencies since 1964 |
| *Soil type:* | Sand (Typic Udipsamments and Alfic Udipsamments) |
| *Sampling Depth:* | Mineral soil 0–30 cm for fine root estimates; mineral soil 0–15 cm for N mineralization |
| *Soil variables measured:* | Fine root biomass, N concentration, NPP and longevity; mineral soil net N mineralization rate |
| *Response:* | This study evaluated relationships between productivity and fire frequency and tree canopy cover in a long-term prescribed fire study. Fine root biomass and lifespan increased with fire frequency; fine root NPP and soil N mineralization decreased with fire frequency. |

**Table S40.** Summary information for study by Rothstein & Spaulding (2010) [40].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Crawford, Oscoda, Roscommon and Ogemaw Counties, MI |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Various |
| *Time between last fire and sampling (years):* | 4–69 |
| *Fire behavior information:* | Stand-replacing wildfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Comparison data from mature jack pine stands are presented |
| *Soil type:* | Sand (Typic Udipsamments) |
| *Sampling Depth:* | Oi/Oe layer (forest floor); Oa layer; mineral soil 0–15 cm and 15–30 cm. |
| *Soil variables measured:* | Percent silt + clay; total C; total N; N mineralization and nitrification in Oa and 0–15 cm mineral soil; extractable P, K, Ca and Mg |
| *Response:* | Authors focused statistical comparisons on differences in foliar nutrients between wildfire-origin stands and stands that originated following whole-tree harvest. |

**Table S41.** Summary information for study by Rothstein *et al*. (2004) [41].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Highplains district of northern lower peninsula, MI |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1930, 1950, 1966, 1975, 1980, 1988, 1990, 1995, 1998, 2000, 2001 |
| *Time between last fire and sampling (years):* | 1–72 |
| *Fire behavior information:* | Stand-replacing wildfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides data from a chronosequence of time since fire |
| *Soil type:* | Sand (Typic Udipsamments) |
| *Sampling Depth:* | Forest floor; mineral soil 0–10 cm and 10–100 cm |
| *Soil variables measured:* | Surface organic soil C, mineral soil C |
| *Response:* | Forest floor C mass in 1 y stands was 30% of that in mature stands, and this mass declined with age until 12 y before increasing in mature stands. Surface soil C decreased with stand age. Subsurface soil C was greatest at intermediate stand ages. |

**Table S42.** Summary information for study by Schaetzl (1994) [42].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | University of Michigan Biological Station, Pellston, MI; and DNR Red Pine Natural Area, Roscommon, MI |
| *Forest Type:* | Northern hardwood successional stages (Pellston); Old-growth red pine (Roscommon) |
| *Fire Type:* | Prescribed and wildfire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Pellston wildfire: 1901, 1911, or 1923; Pellston clearcut and prescribed fire: 1936, 1948, 1954, or 1980; Roscommon surface fire: 1798, 1888, and 1928. |
| *Time between last fire and sampling (years):* | 12–91 |
| *Fire behavior information:* | Author suggests that 1928 Roscommon fire was a cool/localized surface fire |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides observational data from a chronosequence of time since fire |
| *Soil type:* | Sand (Entic Haplorthods) |
| *Sampling Depth:* | Organic horizon; mineral soil to 5 cm |
| *Soil variables measured:* | Oi and Oe horizon thickness; forest floor thickness; undifferentiated O horizon mass and organic C % and content; A horizon C % and content |
| *Response:* | Logarithmic functions fit to chronosequence data indicated rapid accumulation of organic horizon in years immediately following fire, follwed by reduced rates of accumulation after approximately 100 years. Authors suggest that between 200 to 1000 y are necessary to reach a steady state condition for forest floor thickness and mass. |
| *Other information:* | Empirical data used for theoretical approach |

**Table S43.** Summary information for study by Severson *et al*. (1975) [43].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Carlton County, MN |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | 0 |
| *Fire behavior information:* | Prescribed fire consumed litter layer |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No control; this study provides a comparison between two soil types |
| *Soil type:* | Omega loamy sand (Spodic Udipsamment) |
| *Sampling Depth:* | 0–50 cm x 12 cm diameter soil columns removed for laboratory study |
| *Soil variables measured:* | Particle size distribution, bulk density, cation exchange capacity, exchangeable H, Ca, Mg and K, total C, pH, leaching of P, Ca and K |
| *Response:* | Nutrient mass losses were similar for field-burned soils and soils treated with laboratory burning. Similar nutrient mass losses were observed from leaching burned soils as from unburned soils. Authors suggest that leaching of P, K and Ca from soil are similar following litterfall or following fire. Soil physical data are presented as background data; no data on fire effects on physical soil properties are reported. |

**Table S44.** Summary information for study by Slaughter *et al*. (1998) [44].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Boundary Waters Canoe Area Wilderness, MN |
| *Forest Type:* | Southern boreal; authors present pre-fire forest community for each study stand |
| *Fire Type:* | Wildfire (Little Sioux Fire) |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire from a single wildfire |
| *Reported number of fires within study area:* | 2 |
| *Year(s) of fires:* | 1971 |
| *Time between last fire and sampling (years):* | 1–4, 22 (forest floor); 3, 22 (mineral soil) |
| *Fire behavior information:* | Describes fire weather and spread; presented fire intensity for each stand |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; pre-fire mass of C in the aboveground ecosystem was estimated |
| *Soil type:* | Coarse-textured till and fine-textured lacustrine deposits (Udipsamments, Eutrochrepts, and Dystrochrepts) |
| *Sampling Depth:* | Forest floor (L+F and F+H) and surface mineral soil as described by Ohman & Grigal (1979) |
| *Soil variables measured:* | Forest floor and mineral soil C |
| *Response:* | Forest floor C mass decreased following fire but was greater after 23 y than the estimated pre-fire mass. There was no change in surface mineral soil C between 1974–1993. Some data presented were estimated from other areas. Authors caution that chronosequence studies may produce different results than measurements of a single stand through time. |

**Table S45.** Summary information for study by Smith (1970) [45].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cochrane District, ON |
| *Forest Type:* | Jack pine barren |
| *Fire Type:* | Not specified (likely prescribed fire because pre-fire measurements were taken) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1964 |
| *Time between last fire and sampling (years):* | 0–2 |
| *Fire behavior information:* | Severe fire |
| *Fire Temperature:* | Maximum temperature exceeded 1000 C |
| *Experimental control or pre/post measurements:* | Pre-fire and post-fire measurements |
| *Soil type:* | Sand (Podzol) |
| *Sampling Depth:* | Organic soil (L-H horizons); mineral soil 0–2 cm and 2–42 cm |
| *Soil variables measured:* | Soil moisture, organic matter, pH, conductivity; water- and acid-soluble K, Na, Ca; acid-soluble Fe, Al, P; precipitation |
| *Response:* | Fire reduced organic matter from the L-H horizon by 79% to 91%. Organic matter in the 0–2 cm layer was reduced by fire for 3 months, whereas there was no change at greater depth. Mineral soil organic matter increased 10 to 15 months following fire, relative to pre-burn measurements. Nutrient concentration increased in L-H horizon immediately following fire, and decreased over time; these losses were attributed to leaching. |

**Table S46.** Summary information for study by Smith & James (1978) [46].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | West Luther Township, Wellington County, ON |
| *Forest Type:* | Trembling aspen woodland |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1972 (May), 1973 (April) |
| *Time between last fire and sampling (years):* | 0–1 |
| *Fire behavior information:* | Burn intensity (temperature) and duration; wind speed, relative humidity, ambient temperature; dead biomass combusted, energy content of dead biomass combusted; fireline intensity. Ignition technique included back-firing and head-firing. |
| *Fire Temperature:* | 139 °C–288 °C |
| *Experimental control or pre/post measurements:* | Unburned control |
| *Soil type:* | Organic 'muck' |
| *Sampling Depth:* | 0–5 c, 5–10 cm, 10–15 cm, 15–20 cm |
| *Soil variables measured:* | Soil temperature; acid-extractable P; acetate-extractable K, Mg and Ca. |
| *Response:* | Soil surface temperatures were increased by burning for 2 months following fire. Soil phosphorus, potassium, magnesium and calcium to 10 cm depth were temporarily increased by burning (maximum of 4 months). |
| *Other information:* | Two plots were burned in 1972, two were burned in 1973, and two were unburned to serve as controls. |

**Table S47.** Summary information for study by Smith *et al*. (2010) [47].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Sharpsand Creek, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire and prescribed fire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 1–2 |
| *Year(s) of fires:* | 1948 (wildfire) and 1991 (prescribed fire), each burned and unburned in 2007 (escaped prescribed fire); 1975 (prescribed fire) burned in 2007 |
| *Time between last fire and sampling (years):* | 0, 16, 59 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Authors present data from previously burned stands burned or unburned in 2007 prescribed fire |
| *Soil type:* | Sand (Humo-ferric Podzols) |
| *Sampling Depth:* | Soil surface |
| *Soil variables measured:* | CO2 flux, CO2 flux adjusted for temperature |
| *Response:* | Temperature-adjusted CO2 flux was reduced by recent fire in mature forest relative to unburned mature forest. Recent burning had no effect on temperature-adjusted CO2 flux in the 16-year old forest. Temperature-adjusted CO2 flux increased with time since fire. Authors suggest that these results may be explained by increases in the ratio between autotrophic and heterotrophic soil respiration over time since fire. |

**Table S48.** Summary information for study by Staddon *et al*. (1997) [48].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Chalk River, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire 1 year following clearcut |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1991 |
| *Time between last fire and sampling (years):* | 4 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Uncut and unburned control, and cut and unburned control |
| *Soil type:* | Fine grained sand (Humo-ferric podzol) |
| *Sampling Depth:* | Organic soil collected above Ae horizon, mineral soil 5 cm below  Ae horizon |
| *Soil variables measured:* | Microbial diversity (Shannon, Simpson, McIntosh) and evenness indices |
| *Response:* | Authors present diversity and evenness indices for all treatments at two sampling dates. Sites treated with clearcut and prescirbed fire showed no differences in mineral soil diversity or evenness relative to any other treatment at both sampling dates. This treatment supported greater organic soil Shannon diversity and McIntosh evenness than the clearcut, scarified treatment at the July 10 sampling date, whereas there were no differences among treatments at the July 25 sampling date. |

**Table S49.** Summary information for study by Staddon *et al*. (1998) [49].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Chalk River, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire 1 year following clearcut |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1991 |
| *Time between last fire and sampling (years):* | 4 |
| *Fire behavior information:* | Author cites McAlpine (1995) |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Uncut and unburned control, and cut and unburned control |
| *Soil type:* | Fine grained sand (Humic ferrol Podsol) |
| *Sampling Depth:* | Organic soil, and mineral soil 4–6 cm below Ae horizon |
| *Soil variables measured:* | Acid phosphatase, alkaline phosphatase, arylsulfatase |
| *Response:* | Prescribed fire reduced soil enzyme activities in organic soil. |

**Table S50.** Summary information for study by Staddon *et al*. (1998) [50].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Chalk River, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire 1 year following clearcut |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1991 |
| *Time between last fire and sampling (years):* | 5 |
| *Fire behavior information:* | Fire intensity was 13,202 kW/m |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control |
| *Soil type:* | Fine grained sand (Humo-ferric podzol) |
| *Sampling Depth:* | Organic soil collected above Ae horizon, mineral soil 3–6 cm below Ae horizon |
| *Soil variables measured:* | Microbial diversity, microbial community structure |
| *Response:* | Microbial diversity was reduced by burning in organic and mineral soil horizons. This effect was observed for pooled samples but not for individual samples. |

**Table S51.** Summary information for study by Stocks (1987) [51].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Sharpsand Creek, near Thessalon, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Prescribed fire in immature jack pine |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 2 |
| *Year(s) of fires:* | 1975, 1976 or 1981 prescribed fires implemented in 1948 wildfire site |
| *Time between last fire and sampling (years):* | Not specified |
| *Fire behavior information:* | Fuel load, weather conditions, Canadian Forest Fire Weather Index System components, and fire behavior are given |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Pre-fire fuel load and fire-caused reductions |
| *Soil type:* | Stony (Humoferric podzols) |
| *Sampling Depth:* | Forest floor layer (litter, fermentation, humus) |
| *Soil variables measured:* | Forest floor mass and depth |
| *Response:* | Ground fuel and other data were used in an analysis of fire behavior in immature jack pine stands. |

**Table S52.** Summary information for study by Tang *et al*. (2009) [52].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Various locations in Chequamegon-Nicolet National Forest, WI and Sylvania Wilderness and Recreation Area, MI. Fire site location is 45.87N, 90.18W. |
| *Forest Type:* | Deciduous |
| *Fire Type:* | Repeated prescribed fire following clearcut |
| *Chronosequence or other long-term measurements?* | Disturbance chronosequence not specific to fire |
| *Reported number of fires within study area:* | Repeated burns; number not specified |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Disturbed forests evaluated relative to intermediate aspen (26 y) stands, mature (73 y) northern hardwood stands, and one old-growth (350 y) stand. |
| *Soil type:* | Upland soils. Sandy loam (Spodosols) |
| *Sampling Depth:* | LI-COR sampling chamber 4.4 cm in height |
| *Soil variables measured:* | Soil respiration; soil temperature |
| *Response:* | Cumulative soil respiration was lowest in clearcut and repeatedly burned site, increased and peaked in intermediate aspen, and declined in mature sites |
| *Other information:* | This study focused on a disturbance chronosequence and used a burned site as one of the stand replicates for the young age class (1 year post-disturbance). The burned sites supported short, sparse grass and shrubs. Data on soil respiration and soil temperature and presented for individual sites; C stocks are presented across age classes irrespective of disturbance type. |

**Table S53.** Summary information for study by Tester (1989) [53].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Cedar Creek Natural History Area, MN |
| *Forest Type:* | Oak forest |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 2 to 19 between 1964 to 1984 |
| *Year(s) of fires:* | 1964 to 1984 |
| *Time between last fire and sampling (years):* | See publication for details |
| *Fire behavior information:* | Strip head-fires with flame lengths ≤1 m and 30 cm to 70 cm flame front depth |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control |
| *Soil type:* | Sandy (Udipsamments) |
| *Sampling Depth:* | 0–10 cm |
| *Soil variables measured:* | Mineral soil pH, total N, percent organic matter; percent cover by litter. |
| *Response:* | Fire frequency was positively correlated with pH. There were no significant relationships between fire frequency and total N or percent organic matter. Litter cover decreased with fire frequency. |

**Table S54.** Summary information for study by Van Wagner (1972) [54].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Ottawa River valley, ON |
| *Forest Type:* | Red and white pine, and jack pine |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Not specified |
| *Time between last fire and sampling (years):* | Immediate |
| *Fire behavior information:* | Duff moisture content, Duff Moisture Code, and fire behavior are described |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Pre/post |
| *Soil type:* | Dry medium sand (jack pine stands); Sandy loam till (red and white  pine stands) |
| *Sampling Depth:* | Litter and duff |
| *Soil variables measured:* | Duff consumption |
| *Response:* | Duff consumption increased with decreasing pre-fire duff moisture content and with increasing Duff Moisture Code of the Canadian Forest Fire Weather Index for jack pine and red/white pine stands. |

**Table S55.** Summary information for study by Weber (1985) [55].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Middle Ottawa Forest Section, Great Lakes - St. Lawrence Forest Region, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire and prescribed fire |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire |
| *Reported number of fires within study area:* | 1, 2 or 3 |
| *Year(s) of fires:* | Wildfire in 1920 (Stand 1), with prescribed fire in 1962 (Stand 2) or 1963 (Stand 3), a second wildfire in 1964 (Stand 4, with portions experimentally burned in 1977 (Stand 5)). |
| *Time between last fire and sampling (years):* | 6 to 63 years; study conducted in 1983 |
| *Fire behavior information:* | Stand 1: stand-replacing wildfire; Stand 2: understory prescribed fire; Stand 3: understory prescribed fire of greater intensity than in Stand 2; Stand 4: a second stand-replacing fire; Stand 5: experimental stand-replacing fire |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides observational data from a set of contrasting fire types and times since fire |
| *Soil type:* | Fine grained sand (Typic Haplorthod) |
| *Sampling Depth:* | Forest floor surface |
| *Soil variables measured:* | Soil respiration (*in situ*) as a measure of metabolic activity |
| *Response:* | Respiration increased in spring and decreased in fall in response to temperature, and this pattern was not affected by fire type and time since fire. Authors suggested that fire effects on soil respiration depend on fire severity and re-development of the forest floor post-fire. Stand-replacing fire in young jack pine forest supported the lowest soil respiration. |
| *Other information:* | Mature jack pine stand was naturally-regenerated by a 1920 wildfire. Conclusions from this study are unclear because no clear gradients exist among treatments, and no experimental control was used. |

**Table S56.** Summary information for study by Weber (1987) [56].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Middle Ottawa Forest Section, Great Lakes -St. Lawrence Forest  Region, ON |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire and prescribed fire |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire |
| *Reported number of fires within study area:* | 1, 2 or 3 |
| *Year(s) of fires:* | Wildfire in 1920 (Stand 1), with prescribed fire in 1962 (Stand 2) or 1963 (Stand 3), a second wildfire in 1964 (Stand 4, with portions experimentally burned in 1977 (Stand 5)). |
| *Time between last fire and sampling (years):* | 8 to 65 years |
| *Fire behavior information:* | Stand 1: stand-replacing wildfire; Stand 2: understory prescribed fire; Stand 3: understory prescribed fire of greater intensity than in Stand 2; Stand 4: a second stand-replacing fire; Stand 5: experimental stand-replacing fire |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides observational data from a set of contrasting fire types and times since fire |
| *Soil type:* | Fine grained sand (Typic Haplorthod) |
| *Sampling Depth:* | Authors used litter collected from litterfall traps to quantify forest litter decomposition rates and litter nutrient dynamics |
| *Soil variables measured:* | Overstory and understory litter decomposition over 2 years; litter nutrient dynamics; forest floor nutrient content; forest floor nutrient element and organic matter residence times and annual turnover |
| *Response:* | Overstory litter mass loss did not differ among stands, whereas understory litter mass loss was greater in the three oldest stands. Nutrient dynamics indicate a more severe environment in young stands relative to older stands. |
| *Other information:* | Mature jack pine stand was naturally-regenerated by a 1920 wildfire. Conclusions from this study are unclear because no clear gradients exist among treatments, and no experimental control was used. |

**Table S57.** Summary information for study by White *et al*. (2004) [57].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | University of Michigan Biological Station, Pellston, MI |
| *Forest Type:* | Bigtooth aspen |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 2 |
| *Year(s) of fires:* | Prescribed fires implemented in 1936, 1948, 1954, 1980, and 1998 in 1911 wildfire site |
| *Time between last fire and sampling (years):* | 0–62 |
| *Fire behavior information:* | No |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Adjacent areas within 1911 wildfire site that were not treated with prescribed fire were used as the experimental control |
| *Soil type:* | Sand |
| *Sampling Depth:* | Mineral soil 0–10 cm |
| *Soil variables measured:* | Net N mineralization, net nitrification |
| *Response:* | Net N mineralization and nitrification were greatest immediately following prescribed fire, decreased with increasing time since fire to 20 years post-fire, and then increased to maximum levels in stands representing 70 years post-disturbance. This pattern showed a positive relationship with total aboveground biomass. |

**Table S58.** Summary information for study by Wicklow & Wittingham (1974) [58].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Menominee County, WI |
| *Forest Type:* | Conifer-hardwood complex |
| *Fire Type:* | Wildfires |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | White pine-dominated stand: 1890; Aspen-dominated stand: 1930; Red oak-dominated stand: 1900–1910; Sugar maple, baswood and elm-dominated stand: 1925 |
| *Time between last fire and sampling (years):* | Sampling conducted in 1965 |
| *Fire behavior information:* | Stand-replacing fires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Undisturbed reference stands |
| *Soil type:* | Pine and aspen-dominated stands: loamy sand; Oak-dominated stand: sandy loam; Maple, baswood, elm-dominated stand: silt loam |
| *Sampling Depth:* | Litter, fermentation, humus, A, B horizons |
| *Soil variables measured:* | pH, percent organic matter, P, K, Ca, Mg, B, Mn; numbers of bacterial, fungal and actinomycete propagules and species |
| *Response:* | The species diversity and number of fungal propagules were greater in organic soil than in mineral soil. Number of propagules and species are presented by stand and soil horizon. Similarity coefficients are presented for horizons within stands. Authors suggest that dissimilarity between humus and A2 horizons increases with time since disturbance as a result of podzolization and conifer dominance. |

**Table S59.** Summary information for study by Wicklow & Wittingham (1978) [59].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Menominee County, WI |
| *Forest Type:* | Conifer-hardwood complex |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Long-term effects of fire |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | White pine-dominated stand: 1890; Aspen-dominated stand: 1930; Red oak-dominated stand: 1900–1910; Elm-dominated stand: 1925 |
| *Time between last fire and sampling (years):* | Not specified; study conducted in early/mid-1970s |
| *Fire behavior information:* | Stand-replacing fires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Undisturbed reference stands used as experimental controls |
| *Soil type:* | Pine and aspen-dominated stands: loamy sand; Oak-dominated stand: sandy loam; Elm-dominated stand: silt loam |
| *Sampling Depth:* | Litter, fermentation, humus, A, B horizons |
| *Soil variables measured:* | Soil microfungal populations (populations compared within similar soil texture between disturbed and reference sites) |
| *Response:* | Magnitude of difference in soil microfungal populations in burned stands relative to reference stands was greater for more recent fires than for older fire sites. |

**Table S60.** Summary information for study by Woodruff & Cannon (2010) [60].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Boundary Waters Canoe Area, MN and Voyageurs National Park, MN |
| *Forest Type:* | Southern boreal and Laurentian mixed conifer-hardwood |
| *Fire Type:* | Wildfires (Section 33 fire in VNP; Roy Lake fire in BWCA; multiple locations in BWCA) and slash fires in logged stands (BWCA) |
| *Chronosequence or other long-term measurements?* | Yes: study evaluated short and long-term effects of fire on mercury |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | Section 33: 2004 (July–August); Roy Lake: 1976; Slash fires: 1895–1921 |
| *Time between last fire and sampling (years):* | 1 to 246 years post-fire |
| *Fire behavior information:* | Stand-replacing fires or post-logging slash fires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Controlled (sampled in adjacent areas with no documented fires in recorded history) |
| *Soil type:* | Upland soils. Shallow Inceptisols on glacial outwash over Precambrian bedrock. |
| *Sampling Depth:* | O horizon (excluding forest floor); A horizon |
| *Soil variables measured:* | Mercury, Carbon |
| *Response:* | Fire reduces soil mercury concentrations, and this loss is positively correlated to soil carbon loss. Mercury loss from fire is gradually replaced by atmospheric deposition; however, this occurs at decadal or centennial time scales. |
| *Other information:* | Detailed measurements of Hg and C are available in Supplemental Information from this study. Authors report O and A horizon Hg and C values from low, moderate and high soil burn severity for the Section 33 wildfire. |

**Table S61.** Summary information for study by Wright (1976) [61].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Lamb and Meander lakes watersheds, Boundary Waters Canoe Area, MN |
| *Forest Type:* | Mixed coniferous-deciduous |
| *Fire Type:* | Wildfire (Little Sioux) |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1971 (Spring) |
| *Time between last fire and sampling (years):* | 1 |
| *Fire behavior information:* | Fire burned unevenly and included areas of intense crown fire with adjacent areas of light ground fire |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | Unburned control (unburned Dogfish lake watershed) |
| *Soil type:* | Poorly developed soil; brown, sandy, permeable till; deposits of gray calcareous clays in low bench around Lamb lake |
| *Sampling Depth:* | Under organic soil or duff (overland flow); 1 m (subsurface flow) |
| *Soil variables measured:* | Ca, Mg, K, Na and P in soil water (overland flow, subsurface flow) |
| *Response:* | Burned watersheds had high phosphorus concentrations in overland flow and high cations in subsurface flow, but these elevated concentrations were not sufficient to increase concentrations in stream water or to cause lake eutrophication |

**Table S62.** Summary information for study by Yermakov & Rothstein (2006) [62].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | Highplains district of northern lower peninsula, MI |
| *Forest Type:* | Jack pine |
| *Fire Type:* | Wildfire |
| *Chronosequence or other long-term measurements?* | Chronosequence |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1930, 1950, 1966, 1975, 1980, 1988, 1990, 1995, 1998, 2000, 2001 |
| *Time between last fire and sampling (years):* | 1–72 |
| *Fire behavior information:* | Stand-replacing wildfires |
| *Fire Temperature:* | n.d. |
| *Experimental control or pre/post measurements:* | No experimental control; this study provides data from a chronosequence of time since fire |
| *Soil type:* | Sand (Typic Udipsamments) |
| *Sampling Depth:* | Organic and mineral soil to 10 cm depth |
| *Soil variables measured:* | pH, Ca, Mg, K, Na, available P, soil temperature (5 cm depth), total C and N, N mineralization, soil respiration |
| *Response:* | Soil respiration was not affected by stand age. N mineralization decreased from young to intermediate stand ages, and increased from intermediate to mature stand ages. Authors conclude that the accumulation of surface organic matter controls N availability in fire-origin jack pine stands. |

**Table S63.** Summary information for study by Zeleznik & Dickman (2004) [63].

|  |  |
| --- | --- |
| **Information type** | **Article summary** |
| *Location:* | WK Kellogg Experimental Forest, Augusta, MI |
| *Forest Type:* | Thinned red pine plantation |
| *Fire Type:* | Prescribed fire |
| *Chronosequence or other long-term measurements?* | No |
| *Reported number of fires within study area:* | 1 |
| *Year(s) of fires:* | 1997 (June) |
| *Time between last fire and sampling (years):* | One and two growing seasons post-fire (1997 and 1998) |
| *Fire behavior information:* | Low intensity backing fire; fuel load, fire behavior and weather conditions are reported |
| *Fire Temperature:* | Mineral soil surface: >60 C; 2 cm: <21 C; 6 cm: <15 C |
| *Experimental control or pre/post measurements:* | Control |
| *Soil type:* | Kalamazoo loam, Oshtemo sandy loam (Typic Hapludalfs) (texture determined was loamy sand or sand) |
| *Sampling Depth:* | 25 cm (measurements taken within 0–2, 2–6, 6–10, and 10–25 cm depths) |
| *Soil variables measured:* | Fine roots |
| *Response:* | No significant effect on root system to depth of 25 cm; non-significant trend of reduced fine root mass in forest floor of burned plots in 1998 |

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