LICA LONG TERM SOIL ACIDIFICATION MONITORING
TUCKER LAKE SITE - 2016

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Prepared for:

Lakeland Industry and Community Association

February 2017

EXECUTIVE SUMMARY

The Lakeland Industry and Community Association (LICA) implemented a long term Acid Deposition monitoring program in 2010 with establishment of the Moose Lake site within Moose Lake Provincial Park. This was followed by establishment of the Whitney Lakes site in in 2011 and the Tucker site in 2012. Soil sampling and laboratory analysis of soil samples to establish baseline soil chemistry data were completed for each of these sites in the respective establishment years. The intended long term monitoring interval is four years. This report presents the data from the second sampling event carried out at the Tucker Lake site in fall of 2016.

The LICA monitoring system follows the protocols of Alberta Environment and Parks (AEP; previously Alberta Environment and Sustainable Resource Development) in their Long Term Soil Acidification Monitoring Program. Background information, site selection and results of the first sampling event are described in *LICA Long Term Soil Acidification Monitoring - Tucker Lake Site Establishment* (Abboud and Turchenek 2013).

Soil acidification parameters are soil attributes that can be directly affected by acidic inputs, and which in turn could affect other components of the ecosystem. These attributes include pH, exchangeable base saturation, aluminum (Al) concentration in soil solution, base cation (BC) concentration in soil solution, and the ratio of BC to Al concentrations. Associated attributes are levels of carbon (C), nitrogen (N) and sulphur (S) in surface soil horizons. In particular, total sulphur content can increase in the LFH and surface mineral soil layers of forest soils due to deposition of sulphur oxides. Carbon and N are included with S analyses because the ratios of the three elements can reveal dynamics of these nutrients over a long term.

Soil acidification parameters were examined using descriptive statistics and analysis of variance to determine variability in the data. Base saturation and pHc (pH measured in 0.1 M $CaCl_2$ solution) were the least variable, while BC:Al ratio and individual dissolved ions had coefficients of variation exceeding 1.0 (i.e., >100%) in some cases. Total C, N and S, were highly variable, particularly in the upper mineral layers.

There were some differences in acidification parameters between sub-sites (North and South) but not between sampling years (2012 and 2016). These differences are attributed to variability both within and between sub-sites. Total Carbon reflects the amount of organic matter in the soil, and is highest in the LFH layer and in the upper mineral soil layers. Differences in other parameters such as cation exchange capacity, base cations, BC:Al ratio, Total Nitrogen and Total Sulphur follow the Total Carbon differences because of the adsorptive capacity of organic matter for cations, and because Total Sulphur and Total Nitrogen are generally in organic form in the soil. All data inferences based on the two (2012 and 2016) sampling events are considered to pertain primarily to natural variability of the soil properties. With only two sampling events, no inferences regarding trends are possible.

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1.0 INTRODUCTION

The Lakeland Industry and Community Association (LICA) implemented a long term Acid Deposition monitoring program in 2010 with establishment of the Moose Lake site within Moose Lake Provincial Park. A second site, the Whitney Lakes long term soil acidification monitoring site, was established in 2011. The Tucker Lake site was established in 2012, with soil sampling and laboratory analysis of soil samples completed in order to provide baseline soil chemistry data for the site. The long term monitoring program entails re-sampling of sites at four year intervals. This report presents the data from the second sampling event carried out in fall of 2016.

Background information and site selection are described in *Long Term Soil Acidification Monitoring in the LICA Study Area* (Abboud and Turchenek 2011). Establishment of the Tucker Lake site and results of the first sampling event are presented in *LICA Long Term Soil Acidification Monitoring - Tucker Lake Site Establishment* (Abboud and Turchenek 2013). The LICA monitoring system follows the protocols of Alberta Environment and Parks (AEP; previously Alberta Environment and Sustainable Resource Development) in their Long Term Soil Acidification Monitoring Program (Roberts et al. 1989; Abboud et al. 2012). This program consists of eight monitoring sites established in the late 1980s throughout the Province of Alberta. One of these sites is located within the LICA study area, thus providing a historical monitoring basis for the LICA program. One other site was established near Tucker Lake, northeast on the Town of Bonnyville, in addition to the monitoring sites established at Moose Lake and Whitney Lakes in 2010 and 2011.

Each monitoring site consists of two sub-sites; these are referred to as the North and South sub-sites at the Tucker Lake monitoring site. The sub-sites are normally delineated by a 24 m by 24 m square area that is further subdivided into plots and subplots for replication purposes. At the Tucker Lake site, the South sub-site is 24 m by 24 m, but due to variability in topography only an 18 m by 18 m area of uniform slopes could be fitted into the North sub-site location. At each of the sub-sites (i.e., North and South), twelve replicates are taken of eight soil layers (LFH and 0-2, 2-5, 5-10, 10-15, 15-30, 30-45 and 45-60 cm layers. The report of Abboud and Turchenek (2011) should be consulted for further details of the monitoring protocol. Details of sampling methods and laboratory analysis are also provided in the report of the 2012 sampling event (Abboud and Turchenek 2013).

All soil chemical parameters (see Section 3) were measured for all replicates and all layers in the initial monitoring event in 2012. The purpose was to establish the baseline for the entire depth of sampling. In the current sampling event, and in subsequent years, only the LFH, 0-2, 2-5, 5-10, and 10-15 cm depth samples will be analyzed. This is done in part to reduce the analytical costs. In addition, it has been shown that any effects to date have occurred only in the surface soils layers in the AEP monitoring program (Abboud et al. 2012). Consequently, the long term aspect of monitoring entails determination of the acid chemistry of surface soil layers to 15 cm depth. All samples are archived and will be available for laboratory analysis in the future, should results indicate that changes may be occurring to depths greater than 15 cm.

2.0 METHODS

2.1 SOIL SAMPLING

Soil sampling was carried out as described in Section 4.2.2 of the 2011 soil monitoring report (Abboud and Turchenek (2011).

2.2 LABORATORY ANALYSES

Soil analyses were completed at the Soil Laboratory of the Northern Forestry Centre in Edmonton, Alberta. Samples submitted to the laboratory from the field were kept frozen if they could not be immediately processed. Sample processing consisted of drying at about 30°C and then passing them through a 2 mm sieve. Methods are as described in the 2011 soil monitoring report (Abboud and Turchenek (2011), and method references are repeated below in Table 1.

Table 1. Analytical Methods Applied in Soil Analysis

Parameter	Method	Notes
pH ($CaCl_2$)	Method 3.11 in McKeague (1978)	The soil-to-solution ratio for litter (LFH) material is 1:4 and for mineral soil is 1:2. Solution is 0.1 M $CaCl_2$. Measurement is with a combination pH electrode.
Electrical Conductivity	Method 4.13 in McKeague (1978)	The EC and pH were measured in the saturated paste extract of a soil sample.
Soluble Ions	Method 3.21 in McKeague (1978)	By the saturated paste method and ICP-OES analysis of the extract for Na, K, Ca, Mg, Al, Fe, Mn and S.
Cation Exchange Capacity - Unbuffered	Method 18.2 in Carter and Gregorich (2008)	By unbuffered 0.1 M $BaCl_2$ extraction, and calculation of CEC as sum of exchangeable cations.
Exchangeable Cations	Method 18.2 in Carter and Gregorich (2008)	By ICP-OES analysis for Ca, Mg, Na, K, Fe, Mn, and Al in the unbuffered $BaCl_2$ extract from CEC analysis.
Total Carbon, Nitrogen, and Sulphur	Method 3.611 in McKeague (1978)	Combustion method using a LECO TruSpec CN Carbon/Nitrogen Analyzer (LECO, 2006).

[1] ICP-OES: Inductively Coupled Plasma-Optical Emission Spectroscopy

2.3 STATISTICS

Basic statistics (i.e., mean, standard deviation and coefficient of variability) were calculated for the acidification indicators and their input variables. Coefficient of variation (CV) refers to the standard deviation divided by the mean. Analysis of variance (ANOVA) was performed on the main soil acidification variables, namely pH, base saturation, and base cation:aluminum (BC:Al) ratio, as well as some of the input variables. A two-factor ANOVA using MS Excel© was carried out in order to examine the differences between the two sub-sites (North and South) and the two samples years (2012 and 2016). Tukey's test (Steel and Torrie 1980) was subsequently carried out on these attributes in order to determine whether differences in the data were statistically significant (α=0.05 level of confidence). The statistics were based on the 12 replicates from each sub-site.

3.0 RESULTS

3.1 SOIL ACIDIFICATION PARAMETERS

Soil acidification parameters are soil attributes that can be directly affected by acidic inputs, and which in turn could affect other components of the ecosystem. These attributes include pH, exchangeable base saturation, aluminum (Al) concentration in soil solution, base cation (BC) concentration in soil solution, and the ratio of BC to Al concentrations. A detailed discussion of these is presented in the 2011 LICA soil monitoring report (Abboud and Turchenek 2011). Of the attributes, research has demonstrated effects on vegetation mainly with respect to base saturation percentage and base cation to aluminum ratio. Decreases in either of these attributes can occur with addition of acidic or acidifying substances to the soil. Likewise, pH is expected to decrease. Associated attributes are levels of carbon (C), nitrogen (N) and sulphur (S) in surface soil horizons. In particular, total sulphur content can increase in the LFH and surface mineral soil layers due to deposition of sulphur oxides. Carbon and nitrogen are included in the analyses because the ratios of the three elements can reveal dynamics of these nutrients over a long term.

3.2 SOIL MONITORING RESULTS

Soil samples from the North and South Tucker Lake sub-sites were analyzed for various soil parameters, as described above. The complete data are provided in Appendices A and B. Appendix A presents data as received from the laboratory. Appendix B provides a record of sample identification and types of analyses completed.

Tables 2, 3 and 4 summarize the data for the main acidification indicators and the main parameters from which they were calculated. The following examines some aspects of the data; no comments regarding trends are made as there are only two sampling events at this time.

3.2.1 pHc

The data show slightly higher values of pHc (pH of soil in $CaCl_2$ solution) in the north sub-site as compared to the south sub-site in both 2012 and 2016 (Table 2). Statistically significant differences occur, but these and variability are low, with coefficients of variation (CV) 0.09 or lower.

3.2.2 Base Saturation

Base saturation is shown in Table 2 and is a key acidification indicator defined as the proportion of exchangeable base cations (K, Na, Ca and Mg) to the cation exchange capacity. This parameter has relatively low variability, with CVs ranging from 0.08 to 0.20. Significant differences occur in the 5-10 and 10-15 cm layers. The differences occur between sub-sites rather than sampling years, which suggests variability in the soil material at these depths.

Table 2. Soil pH, Base Saturation, Cation Exchange Capacity and Exchangeable Bases at the Tucker Lake Site - 2016

pHc		LFH				0-2 (cm)				2-5 (cm)				5-10 (cm)				10-15 (cm)			
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	4.4	b	0.28	0.06	4.6	a	0.25	0.06	4.6	a	0.24	0.06	4.6	b	0.19	0.04	4.6	b	0.16	0.04
2016	**North**	4.2	ab	0.26	0.06	4.3	a	0.40	0.09	4.4	a	0.30	0.07	4.4	ab	0.21	0.05	4.4	ab	0.16	0.04
2012	**South**	4.1	a	0.16	0.04	4.6	a	0.19	0.04	4.5	a	0.20	0.04	4.5	ab	0.21	0.05	4.6	ab	0.14	0.03
2016	**South**	4.1	a	0.24	0.06	4.3	a	0.29	0.07	4.4	a	0.21	0.05	4.3	a	0.12	0.03	4.4	a	0.17	0.04
Base Saturation (sum of exchangeable base cations as a proportion of CEC)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	-	-	-	-	0.84	a	0.12	0.15	0.74	a	0.13	0.18	0.68	ab	0.13	0.19	0.63	ab	0.13	0.20
2016	**North**	-	-	-	-	0.84	a	0.10	0.12	0.82	a	0.14	0.18	0.82	c	0.15	0.18	0.80	c	0.11	0.13
2012	**South**	-	-	-	-	0.74	a	0.10	0.14	0.70	a	0.12	0.17	0.62	a	0.12	0.19	0.54	a	0.11	0.20
2016	**South**	-	-	-	-	0.84	a	0.07	0.08	0.83	a	0.07	0.08	0.80	bc	0.07	0.08	0.75	bc	0.08	0.11
Cation Exchange Capacity (cmol/kg)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	-	-	-	-	5.24	a	4.29	0.82	1.94	a	1.13	0.58	1.08	a	0.25	0.23	0.93	b	0.25	0.23
2016	**North**	-	-	-	-	5.02	a	2.91	0.58	2.63	a	1.24	0.47	1.29	a	0.38	0.29	0.98	b	0.38	0.29
2012	**South**	-	-	-	-	4.06	a	1.35	0.35	2.03	a	0.93	0.46	1.16	a	0.36	0.31	0.81	ab	0.36	0.31
2016	**South**	-	-	-	-	3.82	a	1.35	0.35	1.88	a	0.53	0.28	0.99	a	0.17	0.17	0.75	a	0.17	0.17
Sum of Bases (cmol/kg)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	-	-	-	-	4.70	a	4.30	0.92	1.55	a	1.13	0.73	0.75	a	0.31	0.41	0.59	a	0.16	0.28
2016	**North**	-	-	-	-	4.43	a	2.86	0.64	2.25	a	1.22	0.54	1.09	a	0.41	0.37	0.80	b	0.21	0.26
2012	**South**	-	-	-	-	3.09	a	1.69	0.55	1.48	a	0.87	0.59	0.74	a	0.38	0.51	0.44	a	0.14	0.33
2016	**South**	-	-	-	-	3.21	a	1.20	0.37	1.58	a	0.52	0.33	0.80	a	0.18	0.22	0.57	a	0.15	0.26

Abbreviations: pHc – pH measured in 0.01M $CaCl_2$ Exch Bases – sum of exchangeable K, Na, Ca and Mg
CEC – cation exchange capacity BSat – base saturation (sum of exchangeable base/CEC)
Mean – average of 12 replicates in each sub-site
SD – standard deviation CV – coefficient of variation Sig - significance
a, b, ab, c, bc – significance indicators; means followed by the same letter do not differ significantly from one another at P=0.05 (Tukey's test).

Table 3. Water Soluble Ions and Base Cation:Aluminum Ratios at the Tucker Lake Site - 2016

BC:Al Ratio		0-2 (cm)				2-5 (cm)				5-10 (cm)				10-15 (cm)			
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	8.08	a	6.54	0.81	2.68	a	1.02	0.38	1.90	a	0.47	0.25	1.88	a	0.85	0.45
2016	**North**	7.44	a	3.96	0.53	4.49	b	2.07	0.46	2.61	ab	0.98	0.37	2.69	a	1.16	0.43
2012	**South**	6.20	a	2.44	0.39	2.82	a	1.49	0.53	1.96	a	0.64	0.33	1.98	a	0.81	0.41
2016	**South**	10.5	a	8.87	0.84	4.38	ab	5.80	1.33	5.58	b	6.26	1.12	6.12	b	2.83	0.46
K (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	12.7	a	5.05	0.40	5.73	a	2.26	0.39	3.91	a	2.14	0.55	2.98	a	1.02	0.38
2016	**North**	19.9	a	12.7	0.64	11.4	b	6.99	0.62	6.97	a	3.84	0.55	4.88	b	2.07	0.46
2012	**South**	14.9	a	9.09	0.61	5.99	a	2.20	0.37	3.77	a	1.44	0.38	2.59	a	1.49	0.53
2016	**South**	10.6	a	4.32	0.41	8.81	ab	5.38	0.61	7.87	a	6.50	0.83	5.59	a	5.80	1.33
Ca (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	27.3	a	9.31	0.34	17.4	a	8.52	0.49	11.2	a	3.80	0.34	9.01	a	2.99	0.33
2016	**North**	36.6	a	15.0	0.41	27.1	a	11.6	0.43	18.0	b	7.98	0.44	11.3	a	4.37	0.39
2012	**South**	32.0	a	14.6	0.46	19.9	a	8.07	0.41	13.5	ab	5.12	0.38	9.07	a	3.90	0.43
2016	**South**	31.5	a	16.4	0.52	17.7	a	7.29	0.41	12.0	ab	4.63	0.38	7.21	a	3.75	0.52
Mg (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	5.40	a	1.85	0.34	3.59	a	1.77	0.49	2.49	a	1.08	0.43	2.20	a	1.07	0.49
2016	**North**	6.52	a	3.40	0.52	4.73	b	2.67	0.56	3.34	a	1.88	0.56	2.27	a	0.91	0.40
2012	**South**	6.13	a	2.28	0.37	3.84	a	1.24	0.32	2.80	a	0.90	0.32	2.04	a	0.54	0.27
2016	**South**	4.99	a	2.40	0.48	3.42	ab	1.36	0.40	2.41	a	1.03	0.43	1.53	a	0.81	0.53
Al (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	6.12	a	3.67	0.60	8.02	a	3.53	0.44	6.91	ab	2.23	0.32	6.19	a	2.34	0.38
2016	**North**	7.22	a	2.99	0.41	7.36	a	1.84	0.25	7.85	b	1.68	0.21	5.28	a	1.31	0.25
2012	**South**	6.72	a	3.06	0.45	8.56	a	2.56	0.30	8.05	b	3.03	0.38	5.68	a	2.02	0.36
2016	**South**	5.03	a	4.00	0.80	8.99	a	5.60	0.62	4.69	a	2.41	0.51	2.01	a	1.05	0.52

Abbreviations: K, Ca, Mg, Al – water soluble cations BC:Al – ratio of (K+Ca+Mg) concentration to Al concentration
Mean – average of 12 replicates in each sub-site SD – standard deviation CV – coefficient of variation Sig - significance:
a, b, ab, c, bc – significance indicators; means followed by the same letter do not differ significantly from one another at P=0.05 (Tukey's test).

Table 4. Total Soil Carbon, Nitrogen and Sulphur at the Tucker Lake Site - 2016

Total Carbon (%)		LFH (cm)				0-2 (cm)				2-5 (cm)				5-10 (cm)				10-15 (cm)			
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	37.9	b	7.63	0.20	2.39	a	1.56	0.65	0.68	a	0.40	0.59	0.37	a	0.18	0.48	0.27	a	0.07	0.27
2016	**North**	29.9	ab	10.1	0.34	2.46	a	1.18	0.48	1.14	a	0.61	0.53	0.50	a	0.18	0.36	0.33	a	0.11	0.32
2012	**South**	33.3	ab	4.60	0.14	2.57	a	1.63	0.63	0.89	a	0.36	0.41	0.45	a	0.15	0.33	0.27	a	0.06	0.24
2016	**South**	27.2	a	8.96	0.33	1.92	a	0.76	0.39	0.86	a	0.23	0.27	0.49	a	0.07	0.13	0.34	a	0.10	0.30
Total Nitrogen (%)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	1.14	b	0.29	0.25	0.070	a	0.059	0.84	0.011	a			0.005	a	0.001	0.16	0.005	a		
2016	**North**	0.901	ab	0.28	0.32	0.090	a	0.040	0.44	0.044	c	0.02	0.52	0.023	b	0.009	0.38	0.019	b	0.00	0.15
2012	**South**	1.02	ab	0.16	0.15	0.080	a	0.058	0.73	0.016	ab	0.01	0.85	0.006	a	0.002	0.34	0.005	a		
2016	**South**	0.897	a	0.33	0.37	0.069	a	0.024	0.35	0.031	bc	0.01	0.26	0.020	b	0.004	0.23	0.012	b	0.00	0.43
Total Sulphur (%)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2012	**North**	0.112	b	0.029	0.26	0.007	a	0.005	0.72	0.002	a	0.001	0.63	0.001	a	0.001	0.56	0.001	a	0.000	0.48
2016	**North**	0.085	ab	0.021	0.25	0.007	a	0.003	0.50	0.003	a	0.002	0.44	0.002	a	0.001	0.41	0.002	a	0.001	0.42
2012	**South**	0.101	ab	0.024	0.24	0.007	a	0.004	0.54	0.002	a	0.001	0.38	0.001	a	0.0004	0.38	0.001	a	0.000	0.26
2016	**South**	0.082	a	0.030	0.37	0.006	a	0.002	0.33	0.003	a	0.001	0.22	0.002	a	0.001	0.27	0.002	a	0.001	0.30

Abbreviations: See previous table.

3.2.3 Cation Exchange Capacity and Sum of Exchangeable Base Cations

Both of these parameters are variable, with CV ranging from 0.17 to 0.82 for CEC, and 0.2
0.92 for sum of bases (Table 2). However, differences among values are mainly non-significa

3.2.4 Base Cation to Aluminum Ratio (BC:Al) and Water Soluble Ions

Variability of the BC:Al ratio is relatively high as indicated by CV values ranging from 0.25 u
1.33 among the all soil layers (Table 3). Water soluble ions are likewise quite variable, w
soluble Al having the widest CV range at 0.20 to 0.80 among all the layers, sites and year
sampling. The differences are mainly non-significant. The 5-10 cm layer shows signific
differences, but these appear to be unrelated to both sub-site and sampling year.

Higher BC:Al ratios in the 0-2 cm and 2-5 cm layers, as compared to lower layers, ar
consequence of higher base cation contents (K, Ca and Mg), which are associated with
higher organic carbon levels in the surface layers. Organic C (see below) reflects the amour
organic matter in the soil. With increasing organic matter content, there is increasing capacit
adsorb and retain exchangeable cations. The organic matter also decomposes slo
releasing nutrients including base cations, thus leading to relatively higher concentrations in
surface soil layers.

3.2.5 Total Carbon

Total C has relatively high variability, with CVs ranging from 0.13 to 0.65 (Table 4). Hig
contents are typical of LFH (informally referred to as litter or duff) layers in forest s
Relatively higher C in the 0-2 cm and 2-5 cm mineral layers reflects the influence of the l
layer, whereby particulate or soluble C mixes or leaches from the LFH into the upper min
soil. Total C in the LFH layers show significant differences, but these appear to be relate
natural variability within sub-sites.

3.2.6 Total Nitrogen and Total Sulphur

TN and TS contents are low in the mineral soil layers, and they display variability similar to
for TC (Table 4). As for TC, the levels in the mineral soil layers are highest in the 0-2 cm la
and then diminish with depth. TS is an important monitoring parameter, as sulphur
accumulate in the LFH layer and thus reflect the amount of deposition at a site.

3.3 CONCLUSION

Soil acidification parameters were examined using descriptive statistics and analysis of variance to determine variability in the data. Base saturation and pHc were the least variable, while BC:Al ratio had CVs up to 1.33. Of ions used in the calculation of BC:Al ratio, Al had the highest variability (up to 0.8 in the 0-2 cm layer). Total C, N and S were also examined. Variability in these appeared to be related to natural variability both between and within sub-sites.

Differences in acidification parameters between sub-sites (North and South) and between the two sampling years (2012 and 2016) are generally attributable to natural variability. TC, TN and TS contents are highest in the LFH layer and in upper mineral soil layers (0-2 cm and 2-5 cm). The TC reflects the amount of organic matter in the soil. Differences in other parameters such as cation exchange capacity, base cations, BC:Al ratio follow the TC differences because of the adsorptive capacity of organic matter for cations.

All data inferences based on the 2012 and 2016 sampling events pertain only to natural variability of the soil properties. With only two sampling events, no inferences regarding trends over time are possible.

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APPENDIX A

MEAN VALUES OF SOIL ACIDITY PARAMETERS

TUCKER LAKE SOIL MONITORING SITE - 2016

Table A1. Mean Values of Soil Acidity Parameters at the Tucker Lake Monitoring Site

Layer	Statistic	pHc	Exch Bases	CEC	BSat	K	Ca	Mg	Al	BC:Al	TC	TN	TS
(cm)			(cmol kg^{-1})			(cmol L^{-1})					(%)		
North Sub-site													
LFH	Mean	4.2	na	na	na	na	na	na	na	na	29.9	0.90	0.09
	SD	0.3	na	na	na	na	na	na	na	na	10.1	0.28	0.02
	CV	0.1	na	na	na	na	na	na	na	na	0.3	0.3	0.3
0-2	Mean	4.3	4.4	5.0	0.8	19.9	36.6	6.5	7.2	7.7	2.5	0.09	0.01
	SD	0.4	2.9	2.9	0.1	12.7	15.0	3.4	3.0	4.0	1.2	0.04	0.003
	CV	0.1	0.6	0.6	0.1	0.6	0.4	0.5	0.4	0.5	0.5	0.4	0.5
2-5	Mean	4.4	2.3	2.6	0.8	11.4	27.1	4.7	7.4	4.7	1.1	0.044	0.003
	SD	0.3	1.2	1.2	0.1	7.0	11.6	2.7	1.8	2.1	0.6	0.022	0.002
	CV	0.1	0.5	0.5	0.2	0.6	0.4	0.6	0.2	0.44	0.5	0.5	0.4
5-10	Mean	4.4	1.1	1.3	0.8	7.0	18.0	3.3	7.8	2.9	0.5	0.023	0.002
	SD	0.2	0.4	0.4	0.1	3.8	8.0	1.9	1.7	1.0	0.2	0.009	0.001
	CV	0.0	0.4	0.3	0.2	0.6	0.4	0.6	0.2	0.3	0.4	0.4	0.4
10-15	Mean	4.4	0.8	1.0	0.8	4.9	11.3	2.3	5.3	3.1	0.3	0.019	0.002
	SD	0.2	0.2	0.2	0.1	2.7	4.4	0.9	1.3	1.2	0.1	0.003	0.001
	CV	0.0	0.3	0.2	0.1	0.6	0.4	0.4	0.2	0.4	0.3	0.1	0.4
South Sub-site													
LFH	Mean	4.1	na	na	na	na	na	na	na	na	27.2	0.9	0.08
	SD	0.2	na	na	na	na	na	na	na	na	9.0	0.3	0.03
	CV	0.1	na	na	na	na	na	na	na	na	0.3	0.4	0.4
0-2	Mean	4.3	3.2	3.8	0.8	10.6	31.5	5.0	5.0	10.9	1.9	0.07	0.006
	SD	0.3	1.2	1.4	0.1	4.3	16.4	2.4	4.0	9.2	0.8	0.02	0.002
	CV	0.1	0.4	0.4	0.1	0.4	0.5	0.5	0.8	0.8	0.4	0.4	0.3
2-5	Mean	4.4	1.6	1.9	0.8	8.8	17.7	3.4	9.0	4.6	0.9	0.031	0.003
	SD	0.2	0.5	0.5	0.1	5.4	7.3	1.4	5.6	6.0	0.2	0.008	0.001
	CV	0.05	0.3	0.3	0.1	0.6	0.4	0.4	0.6	1.3	0.3	0.3	0.2
5-10	Mean	4.3	0.8	1.0	0.8	7.9	12.0	2.4	4.7	6.2	0.5	0.020	0.002
	SD	0.1	0.2	0.2	0.1	6.5	4.6	1.0	2.4	6.7	0.1	0.004	0.001
	CV	0.03	0.2	0.2	0.1	0.8	0.4	0.4	0.5	1.1	0.1	0.2	0.3
10-15	Mean	4.4	0.6	0.7	0.8	7.9	12.0	2.4	4.7	6.2	0.3	0.012	0.002
	SD	0.2	0.1	0.2	0.1	6.5	4.6	1.0	2.4	0.0	0.1	0.005	0.001
	CV	0.04	0.3	0.2	0.1	0.8	0.4	0.4	0.5	0.0	0.3	0.4	0.3

Abbreviations:
pHc – pH measured in 0.01M $CaCl_2$
CEC – cation exchange capacity
K, Ca, Mg, Al – water soluble cations
TC – total carbon
TS – total sulphur
SD – standard deviation
na – not available or not applicable
Exch Bases – sum of exchangeable K, Na, Ca and Mg
BSat – base saturation (sum of exchangeable base/CEC)
BC:Al – ratio of (K+Ca+Mg) concentration to Al concentration
TN – total nitrogen
Mean – average of 12 replicates (or subplots) in each plot
CV – coefficient of variation

APPENDIX B

LABORATORY DATA

TUCKER LAKE SOIL MONITORING SITE - 2016

Table B1. Soil pH, Electrical Conductivity and Soluble Ions - Tucker Lake North Sub-site

Subplot	Layer (cm)	Sat'n (%)	pH (ext)	EC (dS m^{-1})	Na	K	Ca	Mg	Al	Fe	Mn	S
					(mg L^{-1})							
A2	**0-2**	45.6	4.8	0.19	1.71	13.1	12.8	4.27	11.0	6.03	3.99	5.99
	2-5	35.0	4.9	0.16	2.06	8.09	13.8	3.65	8.11	3.42	4.28	4.98
	5-10	34.0	4.9	0.10	1.54	3.65	6.28	1.89	5.53	2.58	1.76	2.15
	10-15	34.0	4.9	0.09	1.74	3.58	6.07	1.60	3.06	1.34	1.07	1.72
B2	**0-2**	46.8	5.4	0.29	1.33	18.6	55.1	9.84	8.27	3.97	4.14	9.66
	2-5	36.8	5.3	0.22	1.47	14.6	38.3	6.90	7.22	4.78	3.93	6.92
	5-10	35.6	4.9	0.17	1.81	10.4	24.5	5.10	8.84	5.88	1.90	5.38
	10-15	34.8	5.0	0.14	1.85	8.68	12.4	3.37	5.35	2.72	0.514	4.23
C2	**0-2**	62.0	5.1	0.42	1.84	53.9	64.9	15.8	7.66	4.50	5.08	13.8
	2-5	44.8	5.2	0.30	2.07	27.8	47.4	11.8	8.76	5.04	3.71	9.08
	5-10	35.2	5.1	0.22	2.11	14.5	29.7	8.32	8.47	6.22	1.91	6.89
	10-15	34.4	5.2	0.16	2.16	11.3	16.1	4.54	6.20	3.44	1.10	5.32
D2	**0-2**	60.8	5.3	0.21	0.681	20.7	30.2	6.53	5.11	3.44	2.74	6.14
	2-5	39.6	5.5	0.18	0.915	16.6	27.2	5.15	8.79	5.46	2.37	4.33
	5-10	34.8	5.3	0.15	1.02	13.7	15.8	3.13	8.67	4.96	0.860	2.79
	10-15	34.4	5.2	0.09	1.20	4.84	10.4	1.98	5.29	3.03	0.331	1.58
E2	**0-2**	52.0	4.7	0.22	1.52	12.8	33.0	6.05	7.88	3.32	6.24	6.04
	2-5	35.6	4.8	0.13	1.10	6.95	19.5	3.35	7.02	4.03	1.63	2.61
	5-10	34.4	4.9	0.12	1.52	7.11	18.3	2.78	7.12	4.53	1.39	2.50
	10-15	34.4	5.1	0.10	1.83	6.39	11.4	2.02	6.52	4.10	0.671	2.02
F2	**0-2**	54.4	4.8	0.32	1.17	35.5	38.0	8.06	6.70	6.65	3.63	7.22
	2-5	46.0	4.7	0.27	1.57	20.3	44.1	6.88	6.86	5.97	3.95	6.50
	5-10	34.8	4.8	0.16	1.54	6.93	27.7	4.67	7.83	4.74	1.58	3.87
	10-15	34.8	4.6	0.12	1.36	3.87	16.2	2.86	6.77	3.97	0.533	2.47
G2	**0-2**	50.8	4.8	0.17	1.35	9.11	23.1	4.46	5.27	3.92	1.78	5.13
	2-5	43.2	4.9	0.14	1.22	6.50	20.2	3.47	5.29	3.39	2.22	4.37
	5-10	34.8	4.9	0.12	1.71	4.99	13.9	2.81	10.7	4.11	1.02	2.96
	10-15	34.4	4.9	0.10	2.09	3.74	4.75	1.73	6.80	2.92	0.381	2.81
H2	**0-2**	83.5	4.7	0.20	0.664	15.8	32.4	5.07	2.61	1.32	2.01	7.15
	2-5	46.4	4.8	0.15	0.988	9.14	25.0	3.39	3.78	2.04	1.98	4.43
	5-10	35.2	4.8	0.13	1.36	5.28	19.6	2.52	6.43	3.17	1.27	2.65
	10-15	34.8	4.9	0.11	1.08	3.77	13.2	1.99	4.86	2.42	0.515	1.64
I2	**0-2**	59.2	4.1	0.21	0.910	18.9	24.7	4.67	8.64	4.59	3.91	5.32
	2-5	43.0	4.7	0.15	1.42	7.08	17.5	3.01	9.21	2.96	4.19	4.72
	5-10	34.8	4.9	0.13	1.90	4.15	13.1	2.02	5.79	2.49	1.39	2.68
	10-15	34.4	5.1	0.11	2.30	2.44	13.7	1.67	6.12	2.93	0.702	1.88
J2	**0-2**	55.6	4.6	0.21	1.13	15.8	41.9	4.27	4.73	2.82	4.03	7.04
	2-5	39.6	5.0	0.14	1.17	7.15	24.3	2.80	5.53	3.55	2.05	4.04
	5-10	35.2	5.1	0.11	1.08	4.69	11.9	1.76	7.16	3.17	0.911	2.43
	10-15	34.8	5.2	0.10	1.14	3.60	7.91	1.32	3.97	2.33	0.606	1.51
K2	**0-2**	40.0	4.0	0.19	2.07	10.2	29.4	4.85	13.6	5.67	4.75	4.80
	2-5	35.2	4.3	0.15	3.00	5.93	12.9	3.09	10.2	3.56	4.02	3.08
	5-10	34.8	4.5	0.11	2.82	3.25	7.21	2.13	7.06	2.26	2.17	2.02
	10-15	34.8	4.8	0.09	2.35	2.07	5.83	1.80	5.29	2.33	0.965	1.28
L2	**0-2**	75.5	4.8	0.26	1.49	14.6	53.1	4.35	5.19	2.76	5.64	6.46
	2-5	36.4	5.3	0.18	1.41	6.19	34.9	3.20	7.49	3.74	2.19	3.53
	5-10	34.8	5.3	0.14	1.43	5.07	27.4	2.95	10.5	4.48	1.33	2.33
	10-15	34.4	5.3	0.12	1.38	4.25	17.7	2.35	3.16	2.37	0.490	1.40

Table B2. Soil pH, Electrical Conductivity and Soluble Ions - Tucker Lake South Sub-site

Subplot	Layer (cm)	Sat'n (%)	pH (ext)	EC (dS m^{-1})	Na	K	Ca	Mg	Al	Fe	Mn	S
					(mg L^{-1})							
A2	**0-2**	44.4	5.3	0.17	0.549	10.3	13.1	2.56	0.503	1.54	0.926	5.27
	2-5	39.2	5.2	0.15	0.601	10.6	14.7	2.79	0.915	1.40	1.38	3.52
	5-10	34.8	5.1	0.09	0.661	6.53	7.18	1.45	0.447	1.36	0.828	1.12
	10-15	34.4	5.1	0.08	0.663	4.11	5.79	1.06	4.02	1.21	0.601	0.782
B2	**0-2**	48.6	4.8	0.22	1.51	11.5	32.7	4.87	3.78	2.14	5.81	6.41
	2-5	39.2	5.0	0.16	1.48	7.03	20.2	3.29	7.00	2.79	3.52	3.72
	5-10	34.8	5.4	0.13	1.46	7.75	13.0	2.55	7.96	3.22	1.56	2.82
	10-15	34.4	5.5	0.11	1.59	6.23	7.62	1.79	2.29	1.62	0.429	2.81
C2	**0-2**	51.2	4.9	0.16	0.918	8.40	25.7	4.53	3.73	2.40	2.92	4.93
	2-5	39.2	5.1	0.14	1.16	7.04	17.3	3.68	3.90	2.16	2.12	3.65
	5-10	35.6	5.0	0.15	1.78	8.58	12.5	3.35	2.98	1.69	1.67	4.73
	10-15	34.8	5.0	0.12	1.33	5.71	7.63	2.49	1.15	1.24	0.892	3.13
D2	**0-2**	52.4	4.3	0.24	1.23	17.0	38.9	7.26	9.00	4.45	7.29	7.16
	2-5	37.2	4.5	0.24	1.71	22.9	20.2	4.95	13.4	5.65	5.82	5.14
	5-10	35.6	4.8	0.18	2.36	25.4	7.62	2.80	4.97	2.64	1.92	2.77
	10-15	34.8	4.9	0.13	2.47	17.4	1.73	0.572	2.81	1.55	0.093	1.71
E2	**0-2**	44.0	5.0	0.16	0.657	8.80	8.52	2.35	1.09	1.45	1.41	3.70
	2-5	36.0	4.9	0.13	0.925	6.41	9.96	2.24	5.20	3.12	1.14	1.72
	5-10	34.8	4.9	0.11	1.44	4.80	11.1	1.98	1.83	1.97	1.40	1.90
	10-15	34.4	5.0	0.09	1.71	5.01	8.96	1.62	2.19	1.13	0.613	1.01
F2	**0-2**	47.2	5.1	0.17	0.710	7.81	31.5	4.99	3.13	2.15	2.02	5.12
	2-5	36.0	4.9	0.08	1.17	3.34	10.9	1.91	5.02	2.88	0.678	2.00
	5-10	35.2	4.9	0.08	1.19	3.07	9.43	1.57	3.93	2.29	0.497	1.91
	10-15	34.8	5.1	0.05	0.964	2.17	4.71	0.848	1.95	1.31	0.221	1.30
G2	**0-2**	62.8	4.4	0.33	1.95	21.2	69.6	10.9	13.4	5.63	12.4	12.4
	2-5	36.4	4.6	0.22	1.79	14.6	34.4	6.77	13.2	5.70	5.44	6.55
	5-10	35.6	4.7	0.19	2.44	15.5	25.1	5.05	7.19	3.45	2.81	6.27
	10-15	35.2	4.7	0.15	3.00	11.3	16.8	3.50	3.51	2.19	1.47	5.71
H2	**0-2**	50.0	5.2	0.15	0.594	9.65	15.4	3.14	2.39	2.17	1.45	3.96
	2-5	38.4	5.2	0.14	1.13	10.0	17.8	3.77	17.7	4.76	1.53	3.65
	5-10	34.8	5.0	0.09	1.27	6.08	11.2	2.48	7.15	3.59	0.91	2.67
	10-15	34.4	5.0	0.06	1.67	2.73	5.14	1.34	1.63	1.91	0.355	2.09
I2	**0-2**	46.4	5.2	0.19	3.97	8.67	35.2	6.37	11.1	6.29	3.40	6.86
	2-5	36.0	5.1	0.12	3.39	5.08	5.37	1.87	10.2	4.23	1.13	4.46
	5-10	35.2	5.0	0.09	2.78	4.46	8.76	2.15	4.77	2.37	0.981	2.84
	10-15	34.8	5.1	0.08	2.92	3.93	4.22	1.32	0.617	1.18	0.611	1.77
J2	**0-2**	48.8	5.2	0.15	0.749	8.61	25.1	4.38	4.67	1.81	2.41	5.29
	2-5	40.0	5.1	0.12	0.901	7.83	21.1	3.45	9.54	2.96	2.23	3.53
	5-10	35.2	4.9	0.09	1.16	4.83	12.2	2.01	6.75	2.48	1.41	2.56
	10-15	34.8	4.7	0.09	1.75	3.76	9.76	1.55	2.05	1.32	1.03	3.12
K2	**0-2**	56.0	5.0	0.15	1.24	5.58	37.0	2.99	3.26	1.89	2.60	5.85
	2-5	40.0	5.0	0.12	1.72	4.25	21.1	2.96	17.8	3.69	1.59	3.53
	5-10	34.8	5.0	0.08	1.88	2.37	13.1	1.18	5.94	2.53	0.873	1.64
	10-15	34.4	5.2	0.07	2.02	2.12	7.83	0.731	1.00	1.41	0.492	1.18
L2	**0-2**	48.8	5.0	0.20	0.841	10.1	45.5	5.49	4.32	1.94	4.76	5.94
	2-5	36.0	5.5	0.13	0.894	6.59	19.0	3.34	3.93	2.34	2.13	3.19
	5-10	34.8	5.1	0.10	1.22	5.05	13.3	2.42	2.38	1.88	1.15	2.50
	10-15	34.4	5.2	0.07	1.10	2.73	6.26	1.48	0.934	1.51	0.510	1.78

Table B3. pH($CaCl_2$), and Total Carbon, Nitrogen and Sulphur - Tucker Lake North Sub-site

Subplot	Layer (cm)	pH ($CaCl_2$)	Total Carbon (%)	Total Nitrogen (%)	Total Sulphur (%)
A2	LFH	4.0	28.4	0.76	0.076
	0-2	4.3	0.80	0.03	0.003
	2-5	4.3	0.57	0.03	0.002
	5-10	4.3	0.34	0.02	0.002
	10-15	4.3	0.26	0.02	0.001
B2	LFH	4.4	25.7	0.92	0.097
	0-2	4.9	1.92	0.08	0.006
	2-5	4.8	1.14	0.04	0.004
	5-10	4.4	0.62	0.03	0.003
	10-15	4.5	0.32	0.02	0.002
C2	LFH	4.1	26.8	0.94	0.105
	0-2	4.7	4.28	0.14	0.012
	2-5	4.7	2.16	0.09	0.006
	5-10	4.7	0.72	0.04	0.003
	10-15	4.6	0.63	0.02	0.002
D2	LFH	4.4	39.9	1.14	0.098
	0-2	4.7	1.74	0.08	0.005
	2-5	4.9	0.81	0.03	0.003
	5-10	4.7	0.48	0.02	0.002
	10-15	4.6	0.28	0.02	0.002
E2	LFH	4.5	37.2	1.08	0.089
	0-2	4.2	2.06	0.08	0.007
	2-5	4.3	0.32	0.02	0.001
	5-10	4.3	0.33	0.02	0.001
	10-15	4.4	0.26	0.02	0.001
F2	LFH	4.3	36.4	1.06	0.091
	0-2	4.3	2.92	0.10	0.006
	2-5	4.3	2.02	0.07	0.005
	5-10	4.3	0.81	0.03	0.002
	10-15	4.2	0.35	0.02	0.001
G2	LFH	4.3	13.1	0.41	0.040
	0-2	4.2	2.1	0.09	0.007
	2-5	4.3	1.72	0.07	0.004
	5-10	4.3	0.50	0.02	0.002
	10-15	4.3	0.30	0.02	0.001
H2	LFH	4.0	13.1	0.44	0.063
	0-2	4.2	4.43	0.17	0.015
	2-5	4.2	1.39	0.06	0.005
	5-10	4.3	0.53	0.03	0.002
	10-15	4.3	0.34	0.02	0.002

Table B3. pH($CaCl_2$), and Total Carbon, Nitrogen and Sulphur - Tucker Lake North Sub-Site (concluded)

Subplot	Layer (cm)	pH ($CaCl_2$)	Total Carbon (%)	Total Nitrogen (%)	Total Sulphur (%)
I2	LFH	4.4	28.9	0.83	0.072
	0-2	3.7	2.27	0.07	0.005
	2-5	4.2	1.39	0.04	0.004
	5-10	4.5	0.36	0.01	0.001
	10-15	4.6	0.31	0.01	0.001
J2	LFH	3.7	24.7	0.72	0.072
	0-2	4.1	2.03	0.08	0.006
	2-5	4.4	0.97	0.04	0.003
	5-10	4.4	0.62	0.03	0.003
	10-15	4.5	0.39	0.02	0.003
K2	LFH	4.0	41.4	1.32	0.117
	0-2	3.5	1.10	0.04	0.003
	2-5	3.8	0.47	0.01	0.002
	5-10	4.0	0.20	0.01	0.001
	10-15	4.2	0.21	0.02	0.002
L2	LFH	3.8	42.8	1.20	0.104
	0-2	4.2	3.87	0.13	0.008
	2-5	4.6	0.69	0.03	0.002
	5-10	4.7	0.43	0.02	0.001
	10-15	4.6	0.35	0.02	0.001

Table B4. pH($CaCl_2$), and Total Carbon, Nitrogen and Sulphur - Tucker Lake South Sub-site

Subplot	Layer (cm)	pH ($CaCl_2$)	Total Carbon (%)	Total Nitrogen (%)	Total Sulphur (%)
A2	LFH	4.3	18.0	0.52	0.051
	0-2	4.5	1.70	0.07	0.006
	2-5	4.5	0.98	0.05	0.003
	5-10	4.3	0.43	0.01	0.002
	10-15	4.3	0.36	0.01	0.001
B2	LFH	4.2	25.3	0.90	0.078
	0-2	4.1	1.60	0.06	0.005
	2-5	4.3	0.85	0.03	0.004
	5-10	4.6	0.45	0.01	0.003
	10-15	4.8	0.24	0.01	0.001
C2	LFH	3.9	38.4	1.30	0.118
	0-2	4.2	1.38	0.056	0.005
	2-5	4.4	1.00	0.042	0.004
	5-10	4.3	0.52	0.024	0.002
	10-15	4.3	0.31	0.016	0.003
D2	LFH	3.7	43.3	1.43	0.133
	0-2	3.7	1.97	0.07	0.006
	2-5	3.9	0.86	0.03	0.002
	5-10	4.2	0.45	0.02	0.002
	10-15	4.3	0.41	0.01	0.002
E2	LFH	4.0	20.8	0.70	0.052
	0-2	4.3	1.09	0.05	0.004
	2-5	4.3	0.52	0.02	0.003
	5-10	4.3	0.46	0.02	0.002
	10-15	4.4	0.39	0.01	0.002
F2	LFH	4.1	26.9	0.86	0.082
	0-2	4.5	1.82	0.08	0.005
	2-5	4.3	0.41	0.02	0.002
	5-10	4.3	0.53	0.02	0.003
	10-15	4.4	0.22	0.01	0.002
G2	LFH	4.2	36.8	1.26	0.115
	0-2	4.0	3.88	0.14	0.008
	2-5	4.2	0.83	0.03	0.003
	5-10	4.3	0.66	0.03	0.003
	10-15	4.2	0.58	0.02	0.003
H2	LFH	4.3	15.2	0.46	0.048
	0-2	4.6	1.58	0.06	0.003
	2-5	4.6	0.85	0.03	0.003
	5-10	4.5	0.49	0.02	0.002
	10-15	4.4	0.30	0.01	0.002

Table B4. pH($CaCl_2$), and Total Carbon, Nitrogen and Sulphur - Tucker Lake South Sub-site (concluded)

Subplot	Layer (cm)	pH ($CaCl_2$)	Total Carbon (%)	Total Nitrogen (%)	Total Sulphur (%)
I2	LFH	4.6	32.7	1.20	0.107
	0-2	4.7	1.51	0.04	0.004
	2-5	4.5	0.86	0.02	0.003
	5-10	4.4	0.55	0.02	0.002
	10-15	4.4	0.39	0.01	0.002
J2	LFH	4.1	19.7	0.64	0.070
	0-2	4.6	1.74	0.06	0.006
	2-5	4.5	0.98	0.04	0.004
	5-10	4.2	0.49	0.02	0.002
	10-15	4.1	0.31	0.01	0.002
K2	LFH	4.3	28.3	0.94	0.079
	0-2	4.4	2.94	0.08	0.010
	2-5	4.4	1.34	0.03	0.003
	5-10	4.3	0.45	0.02	0.001
	10-15	4.4	0.25	0.01	0.002
L2	LFH	3.9	20.5	0.56	0.046
	0-2	4.4	1.88	0.08	0.006
	2-5	4.7	0.89	0.03	0.003
	5-10	4.4	0.44	0.02	0.002
	10-15	4.5	0.28	0.01	0.002

Table B5. Exchangeable Cations, Cation Exchange Capacity and Base Saturation - Tucker Lake North Sub-site

Subplot	Layer (cm)	pH ($CaCl_2$)	Na	K	Ca	Mg	Al	Fe	Mn	Bases	CEC	Base Saturation
			(cmol kg^{-1})									
A2	LFH	4.0										
	0-2	4.3	0.026	0.072	0.851	0.153	0.248	0.009	0.155	1.10	1.51	0.73
	2-5	4.3	0.024	0.044	0.569	0.116	0.320	0.001	0.142	0.75	1.22	0.62
	5-10	4.3	0.025	0.034	0.341	0.078	0.285	0.002	0.055	0.48	0.82	0.58
	10-15	4.3	0.027	0.037	0.322	0.082	0.167	0.012	0.019	0.47	0.67	0.70
B2	LFH	4.4										
	0-2	4.9	0.020	0.115	4.54	0.482	0.023	<0.001	0.196	5.16	5.38	0.96
	2-5	4.8	0.023	0.086	2.51	0.291	0.035	<0.001	0.131	2.91	3.07	0.95
	5-10	4.4	0.025	0.068	1.09	0.181	0.156	0.008	0.044	1.36	1.57	0.87
	10-15	4.5	0.020	0.069	0.638	0.155	0.180	0.013	0.010	0.88	1.09	0.81
C2	LFH	4.1										
	0-2	4.7	0.025	0.340	6.76	0.951	0.117	0.002	0.391	8.07	8.58	0.94
	2-5	4.7	0.022	0.200	3.93	0.632	0.149	0.002	0.241	4.78	5.17	0.92
	5-10	4.7	0.025	0.113	1.25	0.281	0.112	0.008	0.039	1.67	1.83	0.91
	10-15	4.6	0.023	0.101	0.808	0.167	0.129	0.001	0.042	1.10	1.27	0.86
D2	LFH	4.4										
	0-2	4.7	0.019	0.163	3.45	0.418	0.102	0.001	0.244	4.05	4.40	0.92
	2-5	4.9	0.016	0.088	1.77	0.217	0.053	<0.001	0.080	2.09	2.22	0.94
	5-10	4.7	0.018	0.093	1.03	0.148	0.079	0.004	0.026	1.29	1.40	0.92
	10-15	4.6	0.020	0.051	0.655	0.108	0.070	0.006	0.004	0.83	0.91	0.91
E2	LFH	4.5										
	0-2	4.2	0.022	0.085	2.78	0.292	0.332	0.006	0.460	3.18	3.98	0.80
	2-5	4.3	0.020	0.037	0.662	0.087	0.159	0.004	0.060	0.81	1.03	0.78
	5-10	4.3	0.022	0.050	0.703	0.096	0.208	0.026	0.022	0.87	1.13	0.77
	10-15	4.4	0.025	0.050	0.569	0.080	0.166	0.019	0.014	0.72	0.92	0.79
F2	LFH	4.3										
	0-2	4.3	0.025	0.194	3.31	0.411	0.176	0.006	0.214	3.94	4.34	0.91
	2-5	4.3	0.022	0.118	2.91	0.301	0.362	0.005	0.168	3.35	3.88	0.86
	5-10	4.3	0.022	0.051	1.23	0.151	0.279	0.007	0.038	1.45	1.78	0.82
	10-15	4.2	0.025	0.036	0.558	0.094	0.311	0.016	0.007	0.71	1.05	0.68
G2	LFH	4.3										
	0-2	4.2	0.027	0.068	2.86	0.350	0.304	0.003	0.248	3.30	3.86	0.86
	2-5	4.3	0.028	0.065	2.47	0.253	0.379	0.004	0.194	2.81	3.39	0.83
	5-10	4.3	0.024	0.030	0.898	0.133	0.094	0.002	0.046	1.08	1.23	0.88
	10-15	4.3	0.026	0.036	0.641	0.114	0.222	0.008	0.022	0.82	1.07	0.76
H2	LFH	4.0										
	0-2	4.2	0.015	0.181	9.39	0.869	0.274	0.002	0.574	10.46	11.31	0.92
	2-5	4.2	0.021	0.063	2.55	0.225	0.217	0.001	0.187	2.86	3.27	0.88
	5-10	4.3	0.020	0.043	1.10	0.116	0.196	0.004	0.039	1.28	1.52	0.84
	10-15	4.3	0.020	0.041	0.726	0.114	0.159	0.015	0.011	0.90	1.09	0.83
I2	LFH	4.4										
	0-2	3.7	0.022	0.109	1.82	0.242	0.598	0.005	0.393	2.20	3.19	0.69
	2-5	4.2	0.018	0.061	1.67	0.139	0.432	0.001	0.353	1.89	2.67	0.71
	5-10	4.5	0.022	0.027	0.811	0.068	0.086	0.001	0.028	0.93	1.04	0.89
	10-15	4.6	0.028	0.022	0.744	0.073	0.063	0.005	0.010	0.87	0.95	0.92

Table B5. Exchangeable Cations, Cation Exchange Capacity and Base Saturation - Tucker Lake North Sub-site (concluded)

Subplot	Layer (cm)	pH ($CaCl_2$)	Na	K	Ca	Mg	Al	Fe	Mn	Bases	C.E.C.	Base Saturation
			(cmol kg^{-1})									
J2	LFH	3.7										
	0-2	4.1	0.039	0.089	3.01	0.253	0.217	0.001	0.382	3.39	3.99	0.85
	2-5	4.4	0.021	0.056	1.83	0.155	0.124	0.001	0.125	2.06	2.31	0.89
	5-10	4.4	0.023	0.043	1.00	0.100	0.056	0.001	0.050	1.16	1.27	0.92
	10-15	4.5	0.016	0.036	0.646	0.075	0.094	<0.001	0.030	0.77	0.90	0.86
K2	LFH	4.0										
	0-2	3.5	0.025	0.071	0.830	0.144	0.384	0.012	0.174	1.07	1.64	0.65
	2-5	3.8	0.031	0.032	0.334	0.064	0.368	0.009	0.090	0.46	0.93	0.50
	5-10	4.0	0.023	0.019	0.169	0.037	0.252	0.009	0.029	0.25	0.54	0.46
	10-15	4.2	0.024	0.024	0.290	0.064	0.266	0.022	0.013	0.40	0.70	0.57
L2	LFH	3.8										
	0-2	4.2	0.031	0.106	6.81	0.334	0.192	0.005	0.608	7.28	8.08	0.90
	2-5	4.6	0.023	0.038	2.06	0.136	0.024	0.001	0.102	2.25	2.38	0.95
	5-10	4.7	0.020	0.043	1.09	0.120	0.028	0.006	0.035	1.28	1.34	0.95
	10-15	4.6	0.023	0.046	0.887	0.122	0.103	0.019	0.005	1.08	1.20	0.89

Table B6. Exchangeable Cations, Cation Exchange Capacity and Base Saturation - Tucker Lake South Sub-site

Subplot	Layer (cm)	pH ($CaCl_2$)	Na	K	Ca	Mg	Al	Fe	Mn	Bases	C.E.C.	Base Saturation
			(cmol kg^{-1})									
A2	LFH	4.3										
	0-2	4.5	0.021	0.094	2.18	0.280	0.059	<0.001	0.253	2.58	2.89	0.89
	2-5	4.5	0.018	0.091	1.38	0.162	0.147	<0.001	0.178	1.66	1.98	0.84
	5-10	4.3	0.024	0.060	0.442	0.060	0.139	0.000	0.042	0.59	0.77	0.76
	10-15	4.3	0.024	0.051	0.383	0.050	0.153	0.007	0.019	0.51	0.69	0.74
B2	LFH	4.2										
	0-2	4.1	0.025	0.069	1.99	0.225	0.181	<0.001	0.551	2.31	3.04	0.76
	2-5	4.3	0.024	0.052	1.26	0.145	0.181	<0.001	0.199	1.48	1.86	0.80
	5-10	4.6	0.025	0.066	0.821	0.115	0.050	<0.001	0.051	1.03	1.13	0.91
	10-15	4.8	0.033	0.080	0.566	0.101	0.030	0.009	0.010	0.78	0.83	0.94
C2	LFH	3.9										
	0-2	4.2	0.024	0.068	1.55	0.243	0.181	0.001	0.221	1.88	2.29	0.82
	2-5	4.4	0.022	0.054	1.10	0.184	0.195	<0.001	0.101	1.36	1.65	0.82
	5-10	4.3	0.023	0.043	0.445	0.105	0.177	0.002	0.037	0.62	0.83	0.74
	10-15	4.3	0.028	0.039	0.305	0.076	0.169	0.007	0.009	0.45	0.63	0.71
D2	LFH	3.7										
	0-2	3.7	0.021	0.125	2.14	0.335	0.415	0.008	0.653	2.63	3.70	0.71
	2-5	3.9	0.022	0.091	0.704	0.128	0.309	0.005	0.159	0.94	1.42	0.67
	5-10	4.2	0.022	0.136	0.323	0.097	0.213	0.014	0.029	0.58	0.83	0.69
	10-15	4.3	0.031	0.130	0.249	0.075	0.195	0.015	0.010	0.48	0.70	0.69
E2	LFH	4.0										
	0-2	4.3	0.018	0.061	1.85	0.166	0.144	<0.001	0.244	2.09	2.48	0.84
	2-5	4.3	0.020	0.043	0.937	0.115	0.116	0.004	0.068	1.11	1.30	0.86
	5-10	4.3	0.021	0.045	0.685	0.091	0.172	0.016	0.015	0.84	1.05	0.81
	10-15	4.4	0.024	0.045	0.439	0.060	0.211	0.017	0.004	0.57	0.80	0.71
F2	LFH	4.1										
	0-2	4.5	0.018	0.076	3.90	0.411	0.133	0.001	0.260	4.41	4.80	0.92
	2-5	4.3	0.028	0.034	0.678	0.089	0.177	0.011	0.019	0.83	1.04	0.80
	5-10	4.3	0.025	0.030	0.543	0.067	0.211	0.013	0.010	0.66	0.90	0.74
	10-15	4.4	0.021	0.037	0.340	0.057	0.119	0.007	0.007	0.45	0.59	0.77
G2	LFH	4.2										
	0-2	4.0	0.031	0.169	3.82	0.483	0.485	0.016	0.841	4.50	5.84	0.77
	2-5	4.2	0.021	0.094	1.16	0.204	0.225	0.011	0.127	1.47	1.84	0.80
	5-10	4.3	0.025	0.109	0.820	0.157	0.201	0.016	0.048	1.11	1.38	0.81
	10-15	4.2	0.034	0.103	0.642	0.131	0.275	0.018	0.032	0.91	1.23	0.74
H2	LFH	4.3										
	0-2	4.6	0.020	0.094	2.18	0.266	0.091	<0.001	0.227	2.56	2.88	0.89
	2-5	4.6	0.025	0.090	1.72	0.219	0.081	0.001	0.151	2.05	2.29	0.90
	5-10	4.5	0.026	0.061	0.757	0.130	0.104	0.010	0.034	0.97	1.12	0.87
	10-15	4.4	0.025	0.036	0.356	0.078	0.166	0.012	0.006	0.49	0.68	0.73
I2	LFH	4.6										
	0-2	4.7	0.036	0.081	2.22	0.286	0.076	0.010	0.241	2.62	2.95	0.89
	2-5	4.5	0.031	0.057	1.25	0.169	0.107	0.002	0.144	1.51	1.76	0.86
	5-10	4.4	0.033	0.044	0.688	0.105	0.105	0.003	0.047	0.87	1.02	0.85
	10-15	4.4	0.027	0.040	0.380	0.063	0.164	0.010	0.017	0.51	0.70	0.73

Table B6. Exchangeable Cations, Cation Exchange Capacity and Base Saturation - Tucker Lake South Sub-site (concluded)

Subplot	Layer (cm)	pH ($CaCl_2$)	Na	K	Ca	Mg	Al	Fe	Mn	Bases	C.E.C.	Base Saturation
			(cmol kg^{-1})									
J2	LFH	4.1										
	0-2	4.6	0.021	0.093	2.92	0.349	0.167	0.001	0.354	3.39	3.91	0.87
	2-5	4.5	0.023	0.074	1.75	0.189	0.174	0.001	0.175	2.03	2.38	0.85
	5-10	4.2	0.025	0.043	0.584	0.079	0.168	0.004	0.044	0.73	0.95	0.77
	10-15	4.1	0.025	0.032	0.315	0.049	0.217	0.012	0.017	0.42	0.67	0.63
K2	LFH	4.3										
	0-2	4.4	0.025	0.072	5.50	0.283	0.237	0.001	0.404	5.88	6.52	0.90
	2-5	4.4	0.025	0.041	2.51	0.136	0.171	0.001	0.131	2.71	3.01	0.90
	5-10	4.3	0.027	0.029	0.668	0.057	0.148	0.004	0.030	0.78	0.96	0.81
	10-15	4.4	0.027	0.028	0.537	0.051	0.118	0.005	0.013	0.64	0.78	0.83
L2	LFH	3.9										
	0-2	4.4	0.025	0.085	3.23	0.342	0.228	0.002	0.588	3.68	4.50	0.82
	2-5	4.7	0.022	0.055	1.53	0.199	0.046	<0.001	0.140	1.81	1.99	0.91
	5-10	4.4	0.026	0.038	0.670	0.117	0.062	0.005	0.029	0.85	0.95	0.90
	10-15	4.5	0.024	0.029	0.434	0.076	0.098	0.010	0.008	0.56	0.68	0.83

APPENDIX C

SAMPLE AND ANALYSIS IDENTIFICATION

TUCKER LAKE SOIL MONITORING SITE - 2016

Table C1. Lab Report - Sample Identification

Project: Permanent Site -Acid Deposition -Tucker Lake
Project Leader: Salim Abboud; Project Contact: Larry Turchenek
Date Received: Oct. 11, 2016

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
Oct. 8, 2016	Tucker Lake	North	A2/LFH	385	1		1	1	1	
	Tucker Lake	North	A2/0-2	386	1	1	1	1	1	1
	Tucker Lake	North	A2/2-5	387	1	1	1	1	1	1
	Tucker Lake	North	A2/5-10	388	1	1	1	1	1	1
	Tucker Lake	North	A2/10-15	389	1	1	1	1	1	1
	Tucker Lake	North	A2/15-30	390						
	Tucker Lake	North	A2/30-45	391						
	Tucker Lake	North	A2/45-60	392						
	Tucker Lake	North	B2/LFH	393	1		1	1	1	
	Tucker Lake	North	B2/0-2	394	1	1	1	1	1	1
	Tucker Lake	North	B2/2-5	395	1	1	1	1	1	1
	Tucker Lake	North	B2/5-10	396	1	1	1	1	1	1
	Tucker Lake	North	B2/10-15	397	1	1	1	1	1	1
	Tucker Lake	North	B2/15-30	398						
	Tucker Lake	North	B2/30-45	399						
	Tucker Lake	North	B2/45-60	400						
	Tucker Lake	North	C2/LFH	401	1		1	1	1	
	Tucker Lake	North	C2/0-2	402	1	1	1	1	1	1
	Tucker Lake	North	C2/2-5	403	1	1	1	1	1	1
	Tucker Lake	North	C2/5-10	404	1	1	1	1	1	1
	Tucker Lake	North	C2/10-15	405	1	1	1	1	1	1
	Tucker Lake	North	C2/15-30	406						
	Tucker Lake	North	C2/30-45	407						
	Tucker Lake	North	C2/45-60	408						
	Tucker Lake	North	D2/LFH	409	1		1	1	1	
	Tucker Lake	North	D2/0-2	410	1	1	1	1	1	1
	Tucker Lake	North	D2/2-5	411	1	1	1	1	1	1
	Tucker Lake	North	D2/5-10	412	1	1	1	1	1	1
	Tucker Lake	North	D2/10-15	413	1	1	1	1	1	1
	Tucker Lake	North	D2/15-30	414						
	Tucker Lake	North	D2/30-45	415						
	Tucker Lake	North	D2/45-60	416						

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
	Tucker Lake	North	E2/LFH	417	1		1	1	1	
	Tucker Lake	North	E2/0-2	418	1	1	1	1	1	1
	Tucker Lake	North	E2/2-5	419	1	1	1	1	1	1
	Tucker Lake	North	E2/5-10	420	1	1	1	1	1	1
	Tucker Lake	North	E2/10-15	421	1	1	1	1	1	1
	Tucker Lake	North	E2/15-30	422						
	Tucker Lake	North	E2/30-45	423						
	Tucker Lake	North	E2/45-60	424						
	Tucker Lake	North	F2/LFH	425	1		1	1	1	
	Tucker Lake	North	F2/0-2	426	1	1	1	1	1	1
	Tucker Lake	North	F2/2-5	427	1	1	1	1	1	1
	Tucker Lake	North	F2/5-10	428	1	1	1	1	1	1
	Tucker Lake	North	F2/10-15	429	1	1	1	1	1	1
	Tucker Lake	North	F2/15-30	430						
	Tucker Lake	North	F2/30-45	431						
	Tucker Lake	North	F2/45-60	432						
	Tucker Lake	North	G2/LFH	433	1		1	1	1	
	Tucker Lake	North	G2/0-2	434	1	1	1	1	1	1
	Tucker Lake	North	G2/2-5	435	1	1	1	1	1	1
	Tucker Lake	North	G2/5-10	436	1	1	1	1	1	1
	Tucker Lake	North	G2/10-15	437	1	1	1	1	1	1
	Tucker Lake	North	G2/15-30	438						
	Tucker Lake	North	G2/30-45	439						
	Tucker Lake	North	G2/45-60	440						
	Tucker Lake	North	H2/LFH	441	1		1	1	1	
	Tucker Lake	North	H2/0-2	442	1	1	1	1	1	1
	Tucker Lake	North	H2/2-5	443	1	1	1	1	1	1
	Tucker Lake	North	H2/5-10	444	1	1	1	1	1	1
	Tucker Lake	North	H2/10-15	445	1	1	1	1	1	1
	Tucker Lake	North	H2/15-30	446						
	Tucker Lake	North	H2/30-45	447						
	Tucker Lake	North	H2/45-60	448						
	Tucker Lake	North	I2/LFH	449	1		1	1	1	
	Tucker Lake	North	I2/0-2	450	1	1	1	1	1	1
	Tucker Lake	North	I2/2-5	451	1	1	1	1	1	1
	Tucker Lake	North	I2/5-10	452	1	1	1	1	1	1
	Tucker Lake	North	I2/10-15	453	1	1	1	1	1	1
	Tucker Lake	North	I2/15-30	454						

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
	Tucker Lake	North	I2/30-45	455						
	Tucker Lake	North	I2/45-60	456						
	Tucker Lake	North	J2/LFH	457	1		1	1	1	
	Tucker Lake	North	J2/0-2	458	1	1	1	1	1	1
	Tucker Lake	North	J2/2-5	459	1	1	1	1	1	1
	Tucker Lake	North	J2/5-10	460	1	1	1	1	1	1
	Tucker Lake	North	J2/10-15	461	1	1	1	1	1	1
	Tucker Lake	North	J2/15-30	462						
	Tucker Lake	North	J2/30-45	463						
	Tucker Lake	North	J2/45-60	464						
	Tucker Lake	North	K2/LFH	465	1		1	1	1	
	Tucker Lake	North	K2/0-2	466	1	1	1	1	1	1
	Tucker Lake	North	K2/2-5	467	1	1	1	1	1	1
	Tucker Lake	North	K2/5-10	468	1	1	1	1	1	1
	Tucker Lake	North	K2/10-15	469	1	1	1	1	1	1
	Tucker Lake	North	K2/15-30	470						
	Tucker Lake	North	K2/30-45	471						
	Tucker Lake	North	K2/45-60	472						
	Tucker Lake	North	L2/LFH	473	1		1	1	1	
	Tucker Lake	North	L2/0-2	474	1	1	1	1	1	1
	Tucker Lake	North	L2/2-5	475	1	1	1	1	1	1
	Tucker Lake	North	L2/5-10	476	1	1	1	1	1	1
	Tucker Lake	North	L2/10-15	477	1	1	1	1	1	1
	Tucker Lake	North	L2/15-30	478						
	Tucker Lake	North	L2/30-45	479						
	Tucker Lake	North	L2/45-60	480						
	Tucker Lake	South	A2/LFH	481	1		1	1	1	
	Tucker Lake	South	A2/0-2	482	1	1	1	1	1	1
	Tucker Lake	South	A2/2-5	483	1	1	1	1	1	1
	Tucker Lake	South	A2/5-10	484	1	1	1	1	1	1
	Tucker Lake	South	A2/10-15	485	1	1	1	1	1	1
	Tucker Lake	South	A2/15-30	486						
	Tucker Lake	South	A2/30-45	487						
	Tucker Lake	South	A2/45-60	488						
	Tucker Lake	South	B2/LFH	489	1		1	1	1	
	Tucker Lake	South	B2/0-2	490	1	1	1	1	1	1
	Tucker Lake	South	B2/2-5	491	1	1	1	1	1	1
	Tucker Lake	South	B2/5-10	492	1	1	1	1	1	1
	Tucker Lake	South	B2/10-15	493	1	1	1	1	1	1

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
	Tucker Lake	South	B2/15-30	494						
	Tucker Lake	South	B2/30-45	495						
	Tucker Lake	South	B2/45-60	496						
	Tucker Lake	South	C2/LFH	497	1		1	1	1	
	Tucker Lake	South	C2/0-2	498	1	1	1	1	1	1
	Tucker Lake	South	C2/2-5	499	1	1	1	1	1	1
	Tucker Lake	South	C2/5-10	500	1	1	1	1	1	1
	Tucker Lake	South	C2/10-15	501	1	1	1	1	1	1
	Tucker Lake	South	C2/15-30	502						
	Tucker Lake	South	C2/30-45	503						
	Tucker Lake	South	C2/45-60	504						
	Tucker Lake	South	D2/LFH	505	1		1	1	1	
	Tucker Lake	South	D2/0-2	506	1	1	1	1	1	1
	Tucker Lake	South	D2/2-5	507	1	1	1	1	1	1
	Tucker Lake	South	D2/5-10	508	1	1	1	1	1	1
	Tucker Lake	South	D2/10-15	509	1	1	1	1	1	1
	Tucker Lake	South	D2/15-30	510						
	Tucker Lake	South	D2/30-45	511						
	Tucker Lake	South	D2/45-60	512						
	Tucker Lake	South	E2/LFH	513	1		1	1	1	
	Tucker Lake	South	E2/0-2	514	1	1	1	1	1	1
	Tucker Lake	South	E2/2-5	515	1	1	1	1	1	1
	Tucker Lake	South	E2/5-10	516	1	1	1	1	1	1
	Tucker Lake	South	E2/10-15	517	1	1	1	1	1	1
	Tucker Lake	South	E2/15-30	518						
	Tucker Lake	South	E2/30-45	519						
	Tucker Lake	South	E2/45-60	520						
	Tucker Lake	South	F2/LFH	521	1		1	1	1	
	Tucker Lake	South	F2/0-2	522	1	1	1	1	1	1
	Tucker Lake	South	F2/2-5	523	1	1	1	1	1	1
	Tucker Lake	South	F2/5-10	524	1	1	1	1	1	1
	Tucker Lake	South	F2/10-15	525	1	1	1	1	1	1
	Tucker Lake	South	F2/15-30	526						
	Tucker Lake	South	F2/30-45	527						
	Tucker Lake	South	F2/45-60	528						
	Tucker Lake	South	G2/LFH	529	1		1	1	1	
	Tucker Lake	South	G2/0-2	530	1	1	1	1	1	1

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
	Tucker Lake	South	G2/2-5	531	1	1	1	1	1	1
	Tucker Lake	South	G2/5-10	532	1	1	1	1	1	1
	Tucker Lake	South	G2/10-15	533	1	1	1	1	1	1
	Tucker Lake	South	G2/15-30	534						
	Tucker Lake	South	G2/30-45	535						
	Tucker Lake	South	G2/45-60	536						
	Tucker Lake	South	H2/LFH	537	1		1	1	1	
	Tucker Lake	South	H2/0-2	538	1	1	1	1	1	1
	Tucker Lake	South	H2/2-5	539	1	1	1	1	1	1
	Tucker Lake	South	H2/5-10	540	1	1	1	1	1	1
	Tucker Lake	South	H2/10-15	541	1	1	1	1	1	1
	Tucker Lake	South	H2/15-30	542						
	Tucker Lake	South	H2/30-45	543						
	Tucker Lake	South	H2/45-60	544						
	Tucker Lake	South	I2/LFH	545	1		1	1	1	
	Tucker Lake	South	I2/0-2	546	1	1	1	1	1	1
	Tucker Lake	South	I2/2-5	547	1	1	1	1	1	1
	Tucker Lake	South	I2/5-10	548	1	1	1	1	1	1
	Tucker Lake	South	I2/10-15	549	1	1	1	1	1	1
	Tucker Lake	South	I2/15-30	550						
	Tucker Lake	South	I2/30-45	551						
	Tucker Lake	South	I2/45-60	552						
	Tucker Lake	South	J2/LFH	553	1		1	1	1	
	Tucker Lake	South	J2/0-2	554	1	1	1	1	1	1
	Tucker Lake	South	J2/2-5	555	1	1	1	1	1	1
	Tucker Lake	South	J2/5-10	556	1	1	1	1	1	1
	Tucker Lake	South	J2/10-15	557	1	1	1	1	1	1
	Tucker Lake	South	J2/15-30	558						
	Tucker Lake	South	J2/30-45	559						
	Tucker Lake	South	J2/45-60	560						
	Tucker Lake	South	K2/LFH	561	1		1	1	1	
	Tucker Lake	South	K2/0-2	562	1	1	1	1	1	1
	Tucker Lake	South	K2/2-5	563	1	1	1	1	1	1
	Tucker Lake	South	K2/5-10	564	1	1	1	1	1	1
	Tucker Lake	South	K2/10-15	565	1	1	1	1	1	1
	Tucker Lake	South	K2/15-30	566						
	Tucker Lake	South	K2/30-45	567						

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2015)	pH (CaCl2)	C.E.C. (BaCl2)	Total Carbon	Total Nitrogen	Total Sulfur	Sat.Paste(pH,E.C.,Sat'n, Ca,Mg,Na,K,Al,Fe,Mn,S)
	Tucker Lake	South	K2/45-60	568						
	Tucker Lake	South	L2/LFH	569	1		1	1	1	
	Tucker Lake	South	L2/0-2	570	1	1	1	1	1	1
	Tucker Lake	South	L2/2-5	571	1	1	1	1	1	1
	Tucker Lake	South	L2/5-10	572	1	1	1	1	1	1
	Tucker Lake	South	L2/10-15	573	1	1	1	1	1	1
	Tucker Lake	South	L2/15-30	574						
	Tucker Lake	South	L2/30-45	575						
	Tucker Lake	South	L2/45-60	576						
				Total Ana =	120	96	120	120	120	96