LICA LONG TERM SOIL ACIDIFICATION MONITORING
MOOSE LAKE SITE - 2014

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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. Soil sampling and laboratory analysis of soil samples to establish baseline soil chemistry data for the site was completed at that time. The intended long term monitoring interval is four years. This report presents the data from the second sampling event carried out in fall of 2014.

The LICA monitoring system follows the protocols of Alberta Environment and Sustainable Resource Development (ESRD) in their Long Term Soil Acidification Monitoring Program. Background information, site selection and results of the first sampling event are described in *Long Term Soil Acidification Monitoring in the LICA Study Area* (Abboud and Turchenek 2011).

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 due to deposition of sulphur oxides. Carbon and nitrogen analyses are included in 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 were the least variable, while BC:Al ratio had CVs up to 0.73, with individual dissolved ions exceeding 1.0 (i.e., >100%) in some cases. Total C, N and S, as well as the ratios of these with each other, were highly variable, particularly in the upper mineral layers.

There were some differences in acidification parameters between sub-sites (East and West) and between the two sampling years (2010 and 2014). One apparently consistent difference occurred in the TC content in upper layers of the East as compared to the West sub-site. 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, TN and TS follow the TC differences because of the adsorptive capacity of organic matter for cations, and because TS and TN are generally in organic form in the soil. All data inferences based on two sampling events are considered top pertain only 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. Soil sampling and laboratory analysis of soil samples to establish baseline soil chemistry data for the site was completed at that time. The long term monitoring was established to re-sample soils at four year intervals. This report presents the data from the second sampling event carried out in fall of 2014.

Background information, site selection and results of the first sampling event are described in Long Term Soil Acidification Monitoring in the LICA Study Area (Abboud and Turchenek 2011). The LICA monitoring system follows the protocols of Alberta Environment and Sustainable Resource Development (ESRD) in their Long Term Soil Acidification Monitoring Program (Roberts et al. 1989). This program consists of eight monitoring sites established in the 1980s throughout the Province of Alberta. One of these sites is located within the LICA study area, providing a historical monitoring basis for the LICA program. Since the initial site establishment at Moose Lake in 2010, two other sites were set up, one in Whitney Lakes Provincial Park, and one near Tucker Lake, northeast on the Town of Bonnyville.

Each monitoring site consists of two sub-sites; these are referred to as the West and East sub-sites at the Moose Lake monitoring site. Each sub-site is delineated by a 24 m by 24 m area that is further subdivided into plots and subplots for replication purposes. At each of the sub-sites (i.e., East and West), 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 2011 report.

All soil chemical parameters (see Section 3) were measured for all replicates and all layers in the initial monitoring event in 2010. 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 associated with monitoring. In addition, it has been shown that any effects to date have occurred only in the surface soils layers in the ESRD long term 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 are occurring potentially 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 cold 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, 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 material is 1:4 and for mineral soil is 1:2. Solution is $CaCl_2$. 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[1] analysis of the extract for Na, K, Ca, Mg, Al, Fe, Mn and S.
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.
Cation Exchange Capacity - Unbuffered	Method 18.2 in Carter and Gregorich (2008)	By sum of Exchangeable Cations (Total Exchangeable Cations (TEC))
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 – atomic emission spectrscopy

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 individual element levels and ratios. A two-factor ANOVA using MS Excel© was carried out in order to examine the differences between the two sub-sites (East and West) and the two samples years (2010 and 2014). Tukey's test (Steel and Torrie 1980) was subsequently carried out on these attributes in order to determine if differences in the data were statistically significant (at the 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 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 East and West Moose Lake sub-sites were analyzed for various soil parameters, as described above. The complete data are provided in Appendices A and B. Data in Appendix A are presented with simple statistics for each soil attribute according to soil layer and soil sub-site. Appendix B presents data as received from the laboratory.

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 slight decreases in pHc (pH of soil mixed with $CaCl_2$ solution) in all layers between 2010 and 2014 (Table 2). Significant differences are noted, but the differences are small and variability is low, with coefficients of variation (CV) 0.05 or lower.

3.2.2 Base Saturation

Base saturation refers to the proportion of exchangeable base cations (K, Na, Ca and Mg) to the cation exchange capacity (Table 2). Values within layers differ by up to 0.1 (i.e., about 10%). This parameter is more variable than pHc, with CVs ranging from 0.07 to 0.16. Differences are mainly non-significant, and both increases and decreases occur between the sampling years.

Table 2. Soil pH, Base Saturation, Cation Exchange Capacity and Exchangeable Bases at the Moose Lake Site - 2014

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**
2010	**West**	4.08	b	0.22	0.05	4.69	a	0.18	0.04	4.94	bc	0.20	0.04	4.88	b	0.15	0.03	4.82	b	0.15	0.03
2014	**West**	3.79	a	0.13	0.03	4.34	b	0.20	0.05	4.53	a	0.20	0.04	4.62	a	0.18	0.04	4.72	ab	0.19	0.04
2010	**East**	4.33	c	0.23	0.05	4.68	a	0.19	0.04	4.81	b	0.13	0.03	4.76	ab	0.16	0.03	4.73	ab	0.16	0.03
2014	**East**	4.18	bc	0.13	0.03	4.50	ab	0.24	0.05	4.70	ab	0.20	0.04	4.63	a	0.17	0.04	4.58	a	0.14	0.03
Base Saturation (proportion)																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	-	-	-	-	0.81	a	0.06	0.08	0.87	b	0.06	0.07	0.83	a	0.09	0.11	0.80	a	0.10	0.12
2014	**West**	-	-	-	-	0.74	a	0.11	0.16	0.77	a	0.10	0.14	0.77	a	0.11	0.14	0.79	a	0.11	0.14
2010	**East**	-	-	-	-	0.83	a	0.08	0.10	0.81	ab	0.06	0.08	0.74	a	0.08	0.11	0.72	a	0.08	0.11
2014	**East**	-	-	-	-	0.84	a	0.10	0.11	0.85	ab	0.07	0.09	0.79	a	0.09	0.11	0.74	a	0.07	0.10
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**
2010	**West**	-	-	-	-	3.56	a	0.96	0.27	2.26	a	0.89	0.39	1.09	a	0.16	0.15	0.85	a	0.13	0.15
2014	**West**	-	-	-	-	3.77	a	1.63	0.43	2.28	ab	1.29	0.57	1.28	ab	0.35	0.27	1.01	a	0.22	0.22
2010	**East**	-	-	-	-	5.43	ab	2.27	0.42	2.71	ab	1.27	0.47	1.23	a	0.28	0.23	0.95	a	0.15	0.16
2014	**East**	-	-	-	-	6.19	b	3.22	0.52	3.48	b	1.07	0.31	1.84	b	0.96	0.52	1.09	a	0.35	0.32
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**
2010	**West**	-	-	-	-	2.88	a	0.88	0.31	1.99	ab	0.89	0.45	0.91	a	0.19	0.21	0.69	a	0.17	0.25
2014	**West**	-	-	-	-	2.85	a	1.52	0.53	1.80	a	1.19	0.66	1.01	ab	0.37	0.36	0.81	a	0.24	0.29
2010	**East**	-	-	-	-	4.58	ab	2.17	0.47	2.24	ab	1.14	0.51	0.93	a	0.28	0.30	0.69	a	0.16	0.24
2014	**East**	-	-	-	-	5.38	b	3.26	0.61	3.01	b	1.02	0.34	1.49	b	0.90	0.61	0.82	a	0.31	0.38

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 Moose Lake Site - 2014

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**
2010	**West**	3.38	a	1.09	0.32	2.68	a	1.69	0.63	1.53	a	0.42	0.27	1.51	a	0.57	0.38
2014	**West**	8.21	ab	4.25	0.52	4.72	ab	1.82	0.39	3.40	a	1.21	0.36	3.68	ab	1.97	0.54
2010	**East**	8.94	b	5.92	0.66	5.02	ab	2.82	0.56	2.77	a	1.24	0.45	2.08	a	0.77	0.37
2014	**East**	9.77	b	6.89	0.71	6.31	b	2.14	0.34	5.26	b	3.85	0.73	4.80	b	2.81	0.59
K (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	0.16	-	0.07	0.42	0.09	-	0.04	0.43	0.06	-	0.03	0.52	0.05	-	0.02	0.44
2014	**West**	0.27	-	0.14	0.51	0.17	-	0.07	0.42	0.11	-	0.04	0.35	0.08	-	0.03	0.33
2010	**East**	0.24	-	0.12	0.50	0.10	-	0.04	0.37	0.07	-	0.05	0.75	0.04	-	0.03	0.68
2014	**East**	0.40	-	0.17	0.42	0.22	-	0.10	0.47	0.19	-	0.14	0.75	0.11	-	0.07	0.68
Ca (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	0.46	-	0.17	0.37	0.35	-	0.12	0.34	0.21	-	0.07	0.32	0.14	-	0.06	0.44
2014	**West**	0.43	-	0.20	0.46	0.29	-	0.13	0.44	0.23	-	0.09	0.40	0.18	-	0.06	0.35
2010	**East**	0.87	-	0.50	0.58	0.50	-	0.23	0.45	0.25	-	0.08	0.32	0.15	-	0.04	0.28
2014	**East**	0.83	-	0.27	0.32	0.47	-	0.13	0.27	0.31	-	0.11	0.34	0.20	-	0.08	0.41
Mg (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	0.14	-	0.05	0.38	0.11	-	0.04	0.33	0.08	-	0.03	0.38	0.06	-	0.02	0.39
2014	**West**	0.13	-	0.05	0.39	0.09	-	0.04	0.42	0.07	-	0.03	0.39	0.06	-	0.02	0.41
2010	**East**	0.26	-	0.12	0.45	0.16	-	0.07	0.42	0.10	-	0.04	0.38	0.07	-	0.03	0.40
2014	**East**	0.28	-	0.08	0.30	0.16	-	0.05	0.28	0.12	-	0.04	0.35	0.09	-	0.02	0.28
Al (mmol/L)																	
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	0.23	-	0.05	0.22	0.24	-	0.08	0.35	0.23	-	0.07	0.28	0.17	-	0.07	0.42
2014	**West**	0.17	-	0.22	1.30	0.13	-	0.05	0.37	0.13	-	0.06	0.44	0.12	-	0.08	0.68
2010	**East**	0.18	-	0.06	0.33	0.19	-	0.10	0.54	0.18	-	0.09	0.49	0.13	-	0.04	0.32
2014	**East**	0.24	-	0.19	0.79	0.15	-	0.06	0.37	0.14	-	0.06	0.45	0.11	-	0.07	0.63

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 Moose Lake Site - 2014

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**
2010	**West**	29.9	a	8.2	0.28	1.48	a	0.38	0.25	0.80	a	0.32	0.40	0.33	a	0.07	0.20	0.26	a	0.04	0.16
2014	**West**	32.7	a	11.0	0.34	2.00	ab	0.86	0.43	0.94	ab	0.43	0.45	0.43	a	0.14	0.32	0.28	a	0.08	0.28
2010	**East**	41.5	b	3.7	0.09	3.63	bc	0.03	0.11	1.07	ab	0.70	0.65	0.44	a	0.15	0.34	0.26	a	0.03	0.11
2014	**East**	37.8	ab	5.9	0.16	3.15	bc	0.20	0.53	1.39	b	0.53	0.38	0.75	b	0.39	0.52	0.38	a	0.20	0.53
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**
2010	**West**	0.74	-	0.28	0.38	0.02	-	0.01	0.25	0.007	-	0.004	0.51	0.005	-	0.000	0.00	0.005	-	0.000	0.00
2014	**West**	0.91	-	0.26	0.28	0.08	-	0.03	0.32	0.04	-	0.01	0.29	0.03	-	0.005	0.17	0.02	-	0.004	0.16
2010	**East**	1.18	-	0.19	0.16	0.08	-	0.04	0.51	0.02	-	0.02	1.04	0.005	-	0.000	0.00	0.01	-	0.000	0.000
2014	**East**	1.11	-	0.17	0.15	0.13	-	0.04	0.32	0.07	-	0.02	0.29	0.04	-	0.01	0.30	0.03	-	0.01	0.28
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**
2010	**West**	0.09	a	0.03	0.32	0.004	a	0.001	0.22	0.002	a	0.0005	0.21	0.002	a	0.001	0.33	0.001	ab	0.0005	0.36
2014	**West**	0.08	a	0.025	0.32	0.004	a	0.001	0.35	0.002	a	0.001	0.51	0.002	a	0.001	0.45	0.001	a	0.0003	0.27
2010	**East**	0.13	b	0.02	0.17	0.007	b	0.002	0.34	0.004	ab	0.001	0.29	0.002	ab	0.001	0.25	0.002	b	0.000	0.26
2014	**East**	0.10	a	0.02	0.17	0.008	b	0.004	0.45	0.004	b	0.002	0.56	0.003	b	0.0014	0.52	0.002	ab	0.001	0.53
C:N Ratio																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	44	-	15	0.34	65	-	11	0.17	115	-	30	0.26	67	-	13	0.20	51	-	8.2	0.16
2014	**West**	36	-	5.0	0.14	24	-	3.8	0.16	21	-	5.6	0.26	16	-	5.4	0.34	12	-	3.3	0.27
2010	**East**	36	-	6.2	0.17	38	-	9.5	0.25	71	-	27	0.38	89	-	30	0.34	53	-	5.8	0.11
2014	**East**	34	-	4.2	0.12	24	-	3.1	0.13	21	-	3.3	0.16	17	-	4.8	0.28	12	-	3.5	0.28
C:S Ratio																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	347	a	96	0.28	379	a	60	0.16	341	ab	99	0.29	238	a	106	0.44	203	ab	76	0.38
2014	**West**	413	a	70	0.17	531	a	293	0.55	539	b	374	0.69	338	a	189	0.56	267	ab	84	0.31
2010	**East**	338	a	62	0.18	369	a	88	0.24	292	a	100	0.34	222	a	81	0.37	165	a	63	0.38
2014	**East**	394	a	57	0.15	458	a	227	0.50	488	ab	383	0.78	327	a	274	0.84	306	b	212	0.69
N:S Ratio																					
Year	**Sub-site**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**	**Mean**	**Sig**	**SD**	**CV**
2010	**West**	8.2	-	2.2	0.27	6.0	-	1.3	0.22	3.0	-	1.0	0.32	3.5	-	1.3	0.36	4.0	-	1.3	0.33
2014	**West**	11.6	-	0.9	0.07	21.5	-	10.1	0.47	24.1	-	12.0	0.50	20.2	-	5.8	0.28	21.8	-	4.6	0.21
2010	**East**	9.4	-	0.3	0.04	10.3	-	3.4	0.33	5.1	-	3.4	0.67	2.6	-	0.8	0.32	3.1	-	1.1	0.36
2014	**East**	11.5	-	0.6	0.06	18.6	-	8.6	0.46	23.3	-	17.8	0.77	18.4	-	9.4	0.51	23.9	-	11.7	0.49

Abbreviations: See previous table.

3.2.3 Cation Exchange Capacity and Sum of Exchangeable Bases

Both of these parameters are variable, with CV ranging from 0.15 to 0.59 for CEC, and 0.21 to 0.66 for sum of bases (Table 2). In the 0-2 cm layer, both CEC and sum of bases are higher in the East sub-site than in the West sub-site. This is consistent between the two sampling years.

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

The BC:Al ratio is consistently higher in 2014 as compared to 2010, in all soil layers (Table 3). Variability is relatively high as indicated by CV values up to 0.73. Water soluble ions are likewise quite variable, with soluble Al showing the highest variability at 1.30 (130%) in the 0-2 cm layer sampled in 2014. Nevertheless, the means of Al values when compared among sites are relatively similar. However, the Ca and Mg levels in the 0-2 cm and 2-5 cm layers have higher values in the east sub-site as compared to the West sub-site.

Higher BC:Al ratios in the East sub-site as compared to the West sub-site are a consequence of the higher Ca and Mg levels in the East sub-site, particularly in the two uppermost layers. Along with CEC and sum of bases, this feature is likely a consequence of the higher organic carbon levels in the East sub-site. The organic C reflects the amount of organic matter in the soil. With increasing organic matter content, there is increasing capacity to adsorb and retain exchangeable cations.

3.2.5 Total Carbon

Total C has relatively high variability, with CV ranging from 0.11 to 0.53 and 0.38 to 0.65 in the 0-2 cm and 2-5 cm layers, respectively (Table 4). Ranges in CV are narrower in the deeper layers.

Total carbon of the 0-2 cm layer is somewhat higher in the East sub-site than in the West sub-site. As noted previously, this higher level of carbon, reflecting higher organic matter content, is likely associated with the relatively higher CEC, bases and BC:Al ratio in the East sub-site. This feature is a reflection of sub-site differences. The sub-sites are located about 300 m apart, and while they are typical of sandy Brunisols under jack pine forest stands, the East sub-site has had a greater degree of organic matter incorporation in the mineral soil immediately below the LFH layer. This does not diminish the value of one duplicate site versus the other, because pH does not appear to be highly sensitive to the organic matter differences as compared to other individual elements or ions. Also, another main acidification indicator (base saturation) is a ratio, and is thus also not as sensitive to effects of organic matter. BC:Al ratio does have some sensitivity as suggested by the differing values among sites and years in the upper soil layers at both sub-sites.

The LFH layer also displays higher TC content in the East sub-site versus the West sub-site. It is generally expected that TC levels of LFH layers would be similar in different parts of a forest stand because of the similarity in vegetation that contributes the organic material to LFH layers. These differences may be attributable to dissimilarly in degree of decomposition of the organic

matter between the two sites, and/or to differences in degree of mixing of mineral and organic material, particularly at the organic-mineral interface.

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 that for TC (Table 4). As for TC, the contents are higher in the East sub-site as compared to the West sub-site. There appears to be a change in TN between the sampling years, with levels higher in 2014 as compared to 2010.

Total S contents are very low, and they exhibit variability similar to that for TC and TN. As with TC, the levels are highest in the 0-2 cm layer of the East sub-site. Unlike TN, the TS appears to be generally unchanged between 2010 and 2014. This parameter is of importance in monitoring over time, as sulphur can accumulate in the LFH layer and thus reflect the amount of deposition at a site.

3.2.7 C:N, C:S and N:S Ratios

Of these ratios, C:S is of particular interest for the same reasons as indicated for TS above. If TS increases in the soil surface layers, it is expected that C:S would decrease. The C:S ratios are quite high, with values appearing to be higher among layers in 2014 as compared to 2015. However, the variability is high, and significant differences are not apparent, except for the 2-5 cm layer.

4.0 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 0.73, with individual dissolved ions exceeding 1.0 (i.e., >100%) in some cases. Total C, N and S were also examined as total S and the ratios of TC and TN to TS can indicate S accumulation over the long term. Levels of each of these were quite variable, particularly in the upper mineral layers.

Differences in acidification parameters between sub-sites (East and West) and between the two sampling years (2010 and 2014) are generally attributable to natural variability. One apparently consistent difference occurred in the TC content in upper layers of the East as compared to the West sub-site. 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, TN and TS follow the TC differences because of the adsorptive capacity of organic matter for cations, and because TS and TN are generally in organic form in the soil.

All data inferences based on the 2010 and 2014 sampling events pertain only to natural variability of the soil properties. With only two sampling events, no inferences regarding trends are possible.

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APPENDIX A

DATA AND BASIC STATISTICS

MOOSE LAKE SOIL MONITORING SITE - 2014

Appendix Table A1. pHc, Cation Exchange Capacity and Exchangeable Ions - Data and Descriptive Statistics

Sub-site	Subplot/ Layer	pHc	Na	K	Ca	Mg	Al	Fe	Mn	Bases	CEC	Base Saturation
			(cmol/kg)									
West	**A1/0-2**	4.0	0.17	0.07	2.15	0.17	0.88	0.02	0.44	2.55	3.89	0.66
West	**B1/0-2**	4.3	0.16	0.09	1.93	0.19	0.62	0.01	0.21	2.37	3.21	0.74
West	**C1/0-2**	4.5	0.16	0.06	1.93	0.24	0.47	0.01	0.19	2.39	3.06	0.78
West	**D1/0-2**	4.1	0.18	0.18	2.22	0.20	1.10	0.05	0.87	2.78	4.80	0.58
West	**E1/0-2**	4.1	0.17	0.09	1.14	0.17	0.76	0.02	0.26	1.57	2.60	0.60
West	**F1/0-2**	4.3	0.16	0.10	0.62	0.11	0.61	0.01	0.11	0.99	1.72	0.57
West	**G1/0-2**	4.4	0.16	0.15	5.39	0.59	0.40	0.01	0.36	6.29	7.06	0.89
West	**H1/0-2**	4.5	0.17	0.14	1.81	0.22	0.32	0.02	0.28	2.35	2.97	0.79
West	**I1/0-2**	4.4	0.17	0.13	4.75	0.40	0.68	0.02	0.54	5.45	6.70	0.81
West	**J1/0-2**	4.4	0.17	0.12	1.63	0.20	0.44	0.02	0.32	2.12	2.90	0.73
West	**K1/0-2**	4.4	0.13	0.07	1.98	0.16	0.42	<0.001	0.22	2.33	2.97	0.78
West	**L1/0-2**	4.7	0.12	0.10	2.57	0.26	0.12	<0.001	0.15	3.05	3.33	0.92
	Mean	4.34	0.16	0.11	2.34	0.24	0.57	0.02	0.33	2.85	3.77	0.74
	SD	0.20	0.02	0.04	1.38	0.13	0.26	0.01	0.21	1.52	1.63	0.11
	CV	0.05	0.11	0.35	0.59	0.54	0.47	0.61	0.64	0.53	0.43	0.16
East	**A1/0-2**	4.3	0.14	0.17	2.88	0.28	0.74	0.02	0.79	3.48	5.03	0.69
East	**B1/0-2**	4.4	0.14	0.13	2.74	0.26	0.75	0.00	0.43	3.27	4.45	0.74
East	**C1/0-2**	4.7	0.16	0.15	11.10	1.01	0.21	0.01	0.57	12.43	13.22	0.94
East	**D1/0-2**	4.8	0.17	0.11	3.53	0.39	0.11	0.01	0.14	4.20	4.46	0.94
East	**E1/0-2**	4.1	0.17	0.15	2.56	0.34	0.66	0.02	0.52	3.22	4.42	0.73
East	**F1/0-2**	4.8	0.16	0.16	4.84	0.58	0.13	0.01	0.31	5.74	6.20	0.93
East	**G1/0-2**	4.4	0.16	0.14	2.49	0.33	0.51	0.02	0.36	3.13	4.02	0.78
East	**H1/0-2**	4.8	0.16	0.11	3.41	0.44	0.12	0.01	0.16	4.12	4.42	0.93
East	**I1/0-2**	4.4	0.16	0.17	2.54	0.40	0.43	0.03	0.25	3.27	3.98	0.82
East	**J1/0-2**	4.7	0.16	0.14	9.57	1.02	0.20	0.01	0.30	10.89	11.40	0.96
East	**K1/0-2**	4.3	0.16	0.13	2.45	0.29	0.33	0.02	0.30	3.03	3.68	0.82
East	**L1/0-2**	4.3	0.17	0.20	6.75	0.63	0.54	0.03	0.72	7.75	9.03	0.86
	Mean	4.50	0.16	0.15	4.57	0.50	0.39	0.02	0.40	5.38	6.19	0.84
	SD	0.24	0.01	0.03	2.99	0.27	0.24	0.01	0.21	3.26	3.22	0.10
	CV	0.05	0.06	0.17	0.65	0.53	0.62	0.43	0.51	0.61	0.52	0.11

Appendix Table A1. Continued

Sub-site	Subplot/ Layer	pHc	Na	K	Ca	Mg	Al	Fe	Mn	Bases	CEC	Base Saturation
			(cmol/kg)									
West	**A1/2-5**	4.4	0.16	0.04	1.90	0.13	0.45	0.01	0.14	2.24	2.84	0.79
West	**B1/2-5**	4.5	0.16	0.05	0.71	0.10	0.30	0.01	0.06	1.03	1.40	0.74
West	**C1/2-5**	4.6	0.16	0.06	0.78	0.16	0.19	0.01	0.04	1.16	1.41	0.83
West	**D1/2-5**	4.4	0.16	0.05	1.72	0.10	0.54	0.01	0.17	2.04	2.76	0.74
West	**E1/2-5**	4.3	0.17	0.06	0.63	0.11	0.54	0.02	0.11	0.96	1.63	0.59
West	**F1/2-5**	4.4	0.16	0.07	0.48	0.08	0.39	0.01	0.05	0.80	1.26	0.64
West	**G1/2-5**	4.5	0.17	0.11	3.96	0.38	0.42	0.01	0.28	4.62	5.33	0.87
West	**H1/2-5**	4.7	0.17	0.10	0.88	0.15	0.22	0.02	0.10	1.30	1.64	0.79
West	**I1/2-5**	4.7	0.16	0.10	3.09	0.26	0.33	0.01	0.23	3.60	4.17	0.86
West	**J1/2-5**	4.4	0.15	0.05	0.65	0.07	0.36	0.01	0.11	0.92	1.40	0.66
West	**K1/2-5**	4.4	0.13	0.04	1.01	0.07	0.32	<0.001	0.10	1.24	1.67	0.74
West	**L1/2-5**	5.0	0.12	0.06	1.39	0.16	0.03	<0.001	0.05	1.73	1.81	0.96
	Mean	4.53	0.16	0.07	1.43	0.15	0.34	0.01	0.12	1.80	2.28	0.77
	SD	0.20	0.02	0.02	1.09	0.09	0.15	0.00	0.07	1.19	1.29	0.10
	CV	0.04	0.10	0.36	0.76	0.61	0.43	0.17	0.62	0.66	0.57	0.14
East	**A1/2-5**	4.5	0.14	0.09	1.82	0.18	0.48	<0.001	0.23	2.22	2.93	0.76
East	**B1/2-5**	4.7	0.14	0.09	2.90	0.21	0.40	<0.001	0.28	3.34	4.02	0.83
East	**C1/2-5**	4.9	0.17	0.07	2.90	0.33	0.10	0.01	0.21	3.48	3.80	0.91
East	**D1/2-5**	5.1	0.16	0.07	2.95	0.31	0.07	0.01	0.10	3.50	3.68	0.95
East	**E1/2-5**	4.6	0.18	0.07	2.83	0.29	0.31	0.01	0.21	3.36	3.89	0.86
East	**F1/2-5**	4.7	0.16	0.13	2.39	0.34	0.24	0.01	0.20	3.01	3.46	0.87
East	**G1/2-5**	4.5	0.16	0.09	3.22	0.33	0.60	0.01	0.34	3.80	4.75	0.80
East	**H1/2-5**	4.8	0.16	0.17	3.47	0.48	0.20	0.01	0.19	4.28	4.68	0.91
East	**I1/2-5**	4.5	0.17	0.10	0.74	0.18	0.32	0.04	0.05	1.20	1.62	0.74
East	**J1/2-5**	4.7	0.16	0.11	3.27	0.42	0.25	0.01	0.15	3.96	4.37	0.91
East	**K1/2-5**	4.5	0.16	0.06	0.73	0.13	0.26	0.02	0.08	1.08	1.44	0.75
East	**L1/2-5**	4.9	0.17	0.05	2.46	0.24	0.10	0.01	0.10	2.91	3.13	0.93
	Mean	4.70	0.16	0.09	2.47	0.29	0.28	0.02	0.18	3.01	3.48	0.85
	SD	0.20	0.01	0.03	0.92	0.10	0.16	0.01	0.08	1.02	1.07	0.07
	CV	0.04	0.07	0.36	0.37	0.36	0.57	0.54	0.48	0.34	0.31	0.09

Appendix Table A1. Continued

Sub-site	Subplot/ Layer	pHc	Na	K	Ca	Mg	Al	Fe	Mn	Bases	CEC	Base Saturation
			(cmol/kg)									
West	**A1/5-10**	4.5	0.17	0.03	0.68	0.09	0.22	0.01	0.03	0.96	1.23	0.78
West	**B1/5-10**	4.6	0.16	0.04	0.56	0.10	0.17	0.02	0.02	0.86	1.07	0.80
West	**C1/5-10**	4.5	0.16	0.06	0.59	0.13	0.28	0.02	0.02	0.94	1.25	0.75
West	**D1/5-10**	4.6	0.16	0.05	1.01	0.08	0.28	0.02	0.05	1.30	1.65	0.79
West	**E1/5-10**	4.7	0.17	0.05	0.64	0.11	0.27	0.02	0.05	0.97	1.30	0.74
West	**F1/5-10**	4.4	0.16	0.05	0.31	0.07	0.34	0.02	0.02	0.59	0.97	0.61
West	**G1/5-10**	4.7	0.17	0.06	1.34	0.18	0.18	0.01	0.09	1.75	2.02	0.86
West	**H1/5-10**	4.7	0.16	0.07	0.57	0.12	0.21	0.02	0.03	0.91	1.17	0.78
West	**I1/5-10**	4.9	0.17	0.06	1.16	0.14	0.10	0.01	0.04	1.53	1.69	0.91
West	**J1/5-10**	4.3	0.17	0.04	0.17	0.05	0.33	0.02	0.02	0.43	0.81	0.54
West	**K1/5-10**	4.6	0.12	0.03	0.64	0.03	0.18	<0.001	0.03	0.82	1.02	0.80
West	**L1/5-10**	4.9	0.12	0.04	0.77	0.11	0.06	<0.001	0.03	1.03	1.12	0.92
	Mean	4.62	0.16	0.05	0.70	0.10	0.22	0.02	0.04	1.01	1.28	0.77
	SD	0.18	0.02	0.01	0.33	0.04	0.09	0.00	0.02	0.37	0.35	0.11
	CV	0.04	0.10	0.27	0.47	0.41	0.40	0.14	0.54	0.36	0.27	0.14
East	**A1/5-10**	4.7	0.14	0.05	0.60	0.07	0.17	<0.001	0.02	0.87	1.06	0.82
East	**B1/5-10**	4.6	0.17	0.08	1.08	0.16	0.39	0.01	0.16	1.49	2.05	0.72
East	**C1/5-10**	4.9	0.17	0.04	0.79	0.14	0.11	0.01	0.09	1.14	1.35	0.84
East	**D1/5-10**	4.9	0.16	0.06	2.03	0.25	0.15	0.01	0.07	2.50	2.74	0.91
East	**E1/5-10**	4.6	0.17	0.05	1.04	0.16	0.21	0.01	0.07	1.42	1.72	0.83
East	**F1/5-10**	4.5	0.16	0.10	1.00	0.17	0.32	0.01	0.14	1.44	1.91	0.75
East	**G1/5-10**	4.4	0.16	0.06	0.56	0.11	0.36	0.01	0.08	0.90	1.36	0.66
East	**H1/5-10**	4.7	0.16	0.14	3.09	0.43	0.32	0.01	0.21	3.82	4.36	0.88
East	**I1/5-10**	4.4	0.17	0.08	0.35	0.12	0.35	0.04	0.01	0.71	1.11	0.64
East	**J1/5-10**	4.6	0.16	0.08	1.31	0.26	0.24	0.01	0.07	1.81	2.13	0.85
East	**K1/5-10**	4.5	0.16	0.04	0.36	0.08	0.23	0.04	0.02	0.64	0.92	0.69
East	**L1/5-10**	4.7	0.17	0.04	0.75	0.13	0.19	0.02	0.02	1.09	1.32	0.82
	Mean	4.63	0.16	0.07	1.08	0.17	0.25	0.02	0.08	1.49	1.84	0.79
	SD	0.17	0.01	0.03	0.78	0.10	0.09	0.01	0.06	0.90	0.96	0.09
	CV	0.04	0.04	0.42	0.72	0.57	0.36	0.51	0.78	0.61	0.52	0.11

Appendix Table A1. Concluded

Sub-site	Subplot/ Layer	pHc	Na	K	Ca	Mg	Al	Fe	Mn	Bases	CEC	Base Saturation
			(cmol/kg)									
West	**A1/10-15**	4.5	0.17	0.03	0.44	0.07	0.23	0.02	0.01	0.72	0.98	0.73
West	**B1/10-15**	4.8	0.16	0.04	0.57	0.10	0.13	0.02	0.01	0.86	1.02	0.84
West	**C1/10-15**	4.6	0.16	0.06	0.62	0.12	0.23	0.02	0.01	0.96	1.21	0.79
West	**D1/10-15**	4.7	0.16	0.04	0.64	0.08	0.22	0.01	0.03	0.92	1.18	0.78
West	**E1/10-15**	4.8	0.16	0.05	0.59	0.11	0.17	0.02	0.02	0.91	1.12	0.81
West	**F1/10-15**	4.4	0.16	0.05	0.26	0.06	0.32	0.02	0.01	0.53	0.88	0.60
West	**G1/10-15**	4.9	0.16	0.05	0.75	0.13	0.14	0.02	0.04	1.10	1.30	0.85
West	**H1/10-15**	4.8	0.17	0.06	0.44	0.10	0.15	0.02	0.01	0.77	0.95	0.81
West	**I1/10-15**	5.1	0.16	0.05	0.86	0.17	0.07	0.01	0.01	1.23	1.33	0.93
West	**J1/10-15**	4.5	0.17	0.04	0.13	0.04	0.24	0.02	0.01	0.38	0.65	0.58
West	**K1/10-15**	4.7	0.12	0.02	0.44	0.01	0.09	<0.001	0.00	0.59	0.68	0.87
West	**L1/10-15**	4.8	0.13	0.03	0.55	0.08	0.05	<0.001	0.02	0.79	0.86	0.93
	Mean	4.72	0.16	0.04	0.52	0.09	0.17	0.02	0.02	0.81	1.01	0.79
	SD	0.19	0.02	0.01	0.20	0.04	0.08	0.00	0.01	0.24	0.22	0.11
	CV	0.04	0.10	0.30	0.38	0.45	0.48	0.20	0.68	0.29	0.22	0.14
East	**A1/10-15**	4.8	0.14	0.05	0.39	0.05	0.13	<0.001	0.01	0.62	0.76	0.81
East	**B1/10-15**	4.7	0.17	0.06	0.77	0.12	0.25	0.02	0.05	1.12	1.43	0.78
East	**C1/10-15**	4.7	0.17	0.03	0.37	0.11	0.11	0.02	0.02	0.67	0.82	0.82
East	**D1/10-15**	4.7	0.16	0.04	1.14	0.18	0.24	0.01	0.07	1.52	1.84	0.83
East	**E1/10-15**	4.6	0.17	0.04	0.64	0.12	0.17	0.02	0.02	0.97	1.18	0.82
East	**F1/10-15**	4.4	0.17	0.07	0.35	0.09	0.28	0.02	0.04	0.69	1.02	0.67
East	**G1/10-15**	4.5	0.17	0.03	0.28	0.08	0.19	0.02	0.01	0.55	0.77	0.72
East	**H1/10-15**	4.6	0.16	0.07	0.63	0.13	0.25	0.01	0.05	0.99	1.30	0.76
East	**I1/10-15**	4.4	0.17	0.06	0.23	0.10	0.34	0.03	0.01	0.55	0.92	0.60
East	**J1/10-15**	4.4	0.16	0.05	0.66	0.19	0.33	0.03	0.01	1.06	1.44	0.74
East	**K1/10-15**	4.5	0.16	0.04	0.22	0.07	0.23	0.03	0.01	0.49	0.75	0.64
East	**L1/10-15**	4.6	0.17	0.03	0.32	0.10	0.21	0.03	0.01	0.63	0.87	0.72
	Mean	4.58	0.16	0.05	0.50	0.11	0.23	0.02	0.03	0.82	1.09	0.74
	SD	0.14	0.01	0.02	0.27	0.04	0.07	0.01	0.02	0.31	0.35	0.07
	CV	0.03	0.05	0.32	0.55	0.38	0.31	0.32	0.83	0.38	0.32	0.10

Appendix Table A2. Water Soluble Ions and Base Cation:Aluminum Ratio - Data and Descriptive Statistics

Sub-site	Subplot/ Layer	Sat'n (%)	pH (Ext.)	E.C. (dS/m)	Na	K	Ca	Mg	Al	Fe	Mn	S	K	Ca	Mg	Al	BC:Al
					(mg/L)								(mmol/L)				
West	**A2/0-2**	59.6	4.4	0.19	2.01	6.35	21.93	3.05	5.52	3.08	7.40	4.00	0.16	0.55	0.13	0.20	4.08
West	**B2/0-2**	51.6	5.3	0.11	0.71	6.53	10.40	1.66	1.27	0.97	2.01	1.77	0.17	0.26	0.07	0.05	10.50
West	**C2/0-2**	49.2	5.5	0.09	0.42	3.18	7.67	1.77	1.00	0.34	0.02	1.44	0.08	0.19	0.07	0.04	9.29
West	**D2/0-2**	63.6	4.8	0.29	4.31	19.91	29.56	4.92	22.24	16.95	19.65	9.12	0.51	0.74	0.20	0.82	1.76
West	**E2/0-2**	48.0	4.8	0.14	0.96	8.28	11.16	2.43	2.64	1.90	4.13	2.34	0.21	0.28	0.10	0.10	6.03
West	**F2/0-2**	47.2	5.0	0.10	0.59	9.47	5.83	1.32	1.64	0.98	1.84	1.33	0.24	0.15	0.05	0.06	7.28
West	**G2/0-2**	68.8	5.0	0.18	0.69	10.87	23.81	4.78	2.48	1.51	1.98	3.98	0.28	0.59	0.20	0.09	11.65
West	**H2/0-2**	51.6	5.2	0.21	1.37	21.71	20.98	3.98	4.54	3.08	5.73	4.41	0.56	0.52	0.16	0.17	7.39
West	**I2/0-2**	58.4	5.0	0.21	1.61	11.03	29.00	4.59	5.99	3.87	4.57	5.34	0.28	0.72	0.19	0.22	5.38
West	**J2/0-2**	56.8	5.1	0.16	0.89	11.73	14.41	2.98	4.22	2.40	4.69	3.33	0.30	0.36	0.12	0.16	5.01
West	**K2/0-2**	50.8	5.1	0.15	0.60	8.29	14.49	2.79	1.33	0.68	2.31	2.96	0.21	0.36	0.11	0.05	13.93
West	**L2/0-2**	52.0	5.6	0.14	0.80	9.44	16.09	3.43	1.30	0.44	0.01	2.89	0.24	0.40	0.14	0.05	16.25
	Average	54.8	5.1	0.17	1.25	10.57	17.11	3.14	4.51	3.02	4.53	3.58	0.27	0.43	0.13	0.17	8.21
	SD	6.70	0.32	0.06	1.07	5.35	7.93	1.24	5.85	4.54	5.26	2.14	0.14	0.20	0.05	0.22	4.25
	CV	0.12	0.06	0.34	0.86	0.51	0.46	0.39	1.30	1.50	1.16	0.60	0.51	0.46	0.39	1.30	0.52
East	**A2/0-2**	52.8	4.5	0.38	2.46	24.79	47.08	10.73	19.39	15.69	23.67	8.27	0.63	1.17	0.44	0.72	3.13
East	**B2/0-2**	56.0	4.8	0.23	1.38	11.43	26.56	5.03	5.75	3.98	7.32	5.61	0.29	0.66	0.21	0.21	5.46
East	**C2/0-2**	81.5	5.0	0.22	0.89	9.25	34.37	6.20	2.45	1.56	2.94	6.20	0.24	0.86	0.26	0.09	14.89
East	**D2/0-2**	55.2	5.6	0.17	0.68	9.57	21.95	4.24	4.91	2.60	0.73	3.41	0.24	0.55	0.17	0.18	5.32
East	**E2/0-2**	55.2	4.7	0.30	2.19	18.17	35.66	7.54	8.25	5.56	12.72	7.38	0.46	0.89	0.31	0.31	5.45
East	**F2/0-2**	59.6	5.5	0.25	0.77	14.80	29.47	6.37	2.36	1.05	2.52	5.50	0.38	0.73	0.26	0.09	15.75
East	**G2/0-2**	54.4	4.9	0.26	1.44	14.18	25.50	5.87	5.82	4.09	6.95	5.28	0.36	0.64	0.24	0.22	5.75
East	**H2/0-2**	57.2	5.5	0.19	0.76	9.20	23.23	5.20	2.05	0.40	0.00	3.35	0.24	0.58	0.21	0.08	13.57
East	**I2/0-2**	56.8	4.6	0.37	2.29	27.21	44.67	9.50	11.05	9.79	8.99	6.88	0.70	1.11	0.39	0.41	5.38
East	**J2/0-2**	64.8	5.6	0.21	0.78	7.63	22.60	4.87	0.96	0.48	0.98	4.33	0.20	0.56	0.20	0.04	27.08
East	**K2/0-2**	56.8	5.0	0.28	1.41	19.89	34.55	6.02	6.17	4.91	8.84	5.54	0.51	0.86	0.25	0.23	7.08
East	**L2/0-2**	83.8	4.6	0.36	2.62	20.51	55.20	8.79	7.30	4.88	9.93	9.20	0.52	1.38	0.36	0.27	8.37
	Average	61.2	5.0	0.27	1.47	15.55	33.40	6.70	6.37	4.58	7.13	5.91	0.40	0.83	0.28	0.24	9.77
	SD	10.47	0.42	0.07	0.73	6.53	10.76	2.03	5.03	4.39	6.66	1.80	0.17	0.27	0.08	0.19	6.89
	CV	0.17	0.08	0.27	0.50	0.42	0.32	0.30	0.79	0.96	0.93	0.30	0.42	0.32	0.30	0.79	0.71

Appendix Table A2. Continued

Sub-site	Subplot/ Layer	Sat'n (%)	pH (Ext.)	E.C. (dS/m)	Na	K	Ca	Mg	Al	Fe	Mn	S	K	Ca	Mg	Al	BC:Al
					(mg/L)								(mmol/L)				
West	**A2/2-5**	46.0	5.1	0.13	1.20	2.90	12.49	1.65	5.35	3.03	1.87	1.87	0.07	0.31	0.07	0.20	2.29
West	**B2/2-5**	42.0	5.0	0.09	0.88	5.93	7.64	1.40	3.54	2.87	1.53	1.04	0.15	0.19	0.06	0.13	3.05
West	**C2/2-5**	45.6	5.1	0.07	0.51	3.99	6.49	1.66	3.80	1.93	0.05	0.97	0.10	0.16	0.07	0.14	2.36
West	**D2/2-5**	50.0	5.2	0.11	1.11	3.37	12.70	1.36	4.77	2.38	1.79	1.73	0.09	0.32	0.06	0.18	2.60
West	**E2/2-5**	43.2	5.0	0.12	1.46	6.93	9.22	1.96	2.61	1.75	3.35	1.60	0.18	0.23	0.08	0.10	5.04
West	**F2/2-5**	42.8	5.1	0.09	0.61	6.05	4.56	0.88	1.66	1.02	0.95	0.75	0.15	0.11	0.04	0.06	4.96
West	**G2/2-5**	50.4	5.2	0.16	1.15	8.36	19.73	3.69	3.50	1.86	1.98	2.56	0.21	0.49	0.15	0.13	6.63
West	**H2/2-5**	41.6	5.3	0.15	1.72	13.35	13.22	2.97	5.20	3.09	3.18	2.12	0.34	0.33	0.12	0.19	4.12
West	**I2/2-5**	45.2	5.4	0.18	1.75	8.29	22.83	3.35	3.98	2.35	2.74	3.27	0.21	0.57	0.14	0.15	6.24
West	**J2/2-5**	48.6	5.1	0.11	1.16	5.91	8.76	1.64	2.02	0.91	2.69	1.36	0.15	0.22	0.07	0.07	5.84
West	**K2/2-5**	42.8	5.1	0.13	1.10	6.60	11.49	2.06	1.91	0.85	2.14	1.61	0.17	0.29	0.08	0.07	7.63
West	**L2/2-5**	42.8	6.1	0.12	1.00	7.52	12.70	3.08	2.90	1.65	0.95	1.80	0.19	0.32	0.13	0.11	5.92
	Average	45.1	5.2	0.12	1.14	6.60	11.82	2.14	3.44	1.97	1.94	1.72	0.17	0.29	0.09	0.13	4.72
	SD	3.12	0.30	0.03	0.38	2.77	5.24	0.90	1.26	0.79	0.97	0.70	0.07	0.13	0.04	0.05	1.82
	CV	0.07	0.06	0.26	0.33	0.42	0.44	0.42	0.37	0.40	0.50	0.41	0.42	0.44	0.42	0.37	0.39
East	**A2/2-5**	44.8	4.8	0.27	2.41	13.12	30.32	6.60	5.48	2.87	8.03	4.26	0.34	0.76	0.27	0.20	6.72
East	**B2/2-5**	52.8	5.1	0.16	0.99	5.93	19.69	3.04	2.63	0.91	2.65	3.23	0.15	0.49	0.12	0.10	7.87
East	**C2/2-5**	50.0	5.5	0.18	1.39	6.14	23.05	4.76	2.54	1.44	2.78	3.57	0.16	0.57	0.20	0.09	9.88
East	**D2/2-5**	46.0	5.8	0.16	1.29	6.21	21.25	4.02	6.37	3.85	1.32	3.08	0.16	0.53	0.17	0.24	3.62
East	**E2/2-5**	48.4	5.7	0.19	2.23	6.10	20.39	3.68	4.16	2.69	2.67	3.87	0.16	0.51	0.15	0.15	5.29
East	**F2/2-5**	50.4	5.6	0.22	1.20	15.50	20.30	4.91	4.41	2.64	2.72	4.15	0.40	0.51	0.20	0.16	6.76
East	**G2/2-5**	50.0	5.5	0.19	1.44	6.08	16.08	3.18	2.74	1.53	2.80	3.28	0.16	0.40	0.13	0.10	6.78
East	**H2/2-5**	56.0	5.7	0.18	1.19	13.45	15.80	4.19	2.89	0.97	0.65	2.58	0.34	0.39	0.17	0.11	8.50
East	**I2/2-5**	43.2	5.3	0.19	2.38	13.25	14.53	4.35	6.33	3.76	2.16	4.09	0.34	0.36	0.18	0.23	3.75
East	**J2/2-5**	51.6	5.7	0.15	0.66	8.02	13.57	3.24	2.55	1.45	0.97	2.29	0.21	0.34	0.13	0.09	7.16
East	**K2/2-5**	42.4	5.2	0.12	1.26	5.70	10.94	2.44	5.48	3.27	2.35	1.71	0.15	0.27	0.10	0.20	2.56
East	**L2/2-5**	44.8	5.6	0.15	1.82	3.50	22.21	3.31	3.08	2.11	1.49	3.02	0.09	0.55	0.14	0.11	6.83
	Average	48.4	5.5	0.18	1.52	8.58	19.01	3.98	4.06	2.29	2.55	3.26	0.22	0.47	0.16	0.15	6.31
	SD	4.169	0.303	0.04	0.56	4.04	5.20	1.11	1.52	1.04	1.89	0.79	0.10	0.13	0.05	0.06	2.14
	CV	0.086	0.055	0.21	0.37	0.47	0.27	0.28	0.37	0.45	0.74	0.24	0.47	0.27	0.28	0.37	0.34

Appendix Table A2. Continued

Sub-site	Subplot/ Layer	Sat'n (%)	pH (Ext.)	E.C. (dS/m)	Na	K	Ca	Mg	Al	Fe	Mn	S	K	Ca	Mg	Al	BC:Al
					(mg/L)								(mmol/L)				
West	**A2/5-10**	39.6	4.7	0.08	1.03	1.91	8.72	1.28	2.92	1.78	0.94	0.96	0.05	0.22	0.05	0.11	2.96
West	**B2/5-10**	37.6	4.6	0.07	0.70	2.38	6.48	1.13	2.12	1.33	0.46	0.56	0.06	0.16	0.05	0.08	3.42
West	**C2/5-10**	39.6	5.0	0.08	0.82	4.75	6.18	1.57	5.46	2.93	0.15	0.95	0.12	0.15	0.06	0.20	1.68
West	**D2/5-10**	41.2	5.3	0.10	0.80	2.72	11.36	1.21	4.61	2.66	0.99	1.11	0.07	0.28	0.05	0.17	2.36
West	**E2/5-10**	38.4	5.3	0.10	0.92	4.31	8.31	1.60	1.67	0.99	0.05	0.98	0.11	0.21	0.07	0.06	6.19
West	**F2/5-10**	37.6	5.0	0.10	0.90	5.59	4.62	0.97	3.08	1.68	0.66	0.71	0.14	0.12	0.04	0.11	2.61
West	**G2/5-10**	41.6	5.5	0.12	1.15	5.86	14.25	2.88	4.89	3.49	1.12	1.52	0.15	0.36	0.12	0.18	3.44
West	**H2/5-10**	38.0	5.3	0.11	1.39	6.60	8.57	2.07	3.45	2.22	0.97	1.08	0.17	0.21	0.09	0.13	3.66
West	**I2/5-10**	37.6	5.7	0.13	1.32	4.60	15.56	2.29	6.50	4.01	1.17	1.73	0.12	0.39	0.09	0.24	2.49
West	**J2/5-10**	38.0	5.0	0.09	1.78	3.32	3.64	0.96	1.18	0.50	0.77	0.64	0.08	0.09	0.04	0.04	4.92
West	**K2/5-10**	39.6	5.2	0.13	1.23	4.17	10.08	1.67	3.63	1.94	0.89	1.11	0.11	0.25	0.07	0.13	3.18
West	**L2/5-10**	38.4	5.6	0.13	1.15	5.94	10.85	2.78	3.78	1.85	0.70	1.53	0.15	0.27	0.11	0.14	3.84
	Average	38.9	5.2	0.10	1.10	4.35	9.05	1.70	3.61	2.11	0.74	1.07	0.11	0.23	0.07	0.13	3.40
	SD	1.39	0.34	0.02	0.31	1.51	3.61	0.67	1.57	1.02	0.36	0.37	0.04	0.09	0.03	0.06	1.21
	CV	0.04	0.07	0.20	0.28	0.35	0.40	0.39	0.44	0.48	0.49	0.34	0.35	0.40	0.39	0.44	0.36
East	**A2/5-10**	37.6	5.1	0.12	1.72	4.32	9.22	1.89	3.80	2.40	0.89	1.35	0.11	0.23	0.08	0.14	2.97
East	**B2/5-10**	43.2	4.9	0.13	0.91	5.95	12.56	2.50	4.14	2.38	3.40	2.53	0.15	0.31	0.10	0.15	3.71
East	**C2/5-10**	38.4	5.5	0.16	2.12	3.64	13.90	3.29	1.30	0.45	3.20	3.83	0.09	0.35	0.14	0.05	11.99
East	**D2/5-10**	43.6	5.5	0.14	1.65	3.86	16.09	3.26	7.55	3.77	1.07	2.58	0.10	0.40	0.13	0.28	2.27
East	**E2/5-10**	39.6	5.0	0.16	2.44	4.63	14.85	2.95	4.87	3.18	2.17	1.98	0.12	0.37	0.12	0.18	3.38
East	**F2/5-10**	46.4	4.7	0.24	1.89	20.66	16.86	4.30	5.97	3.20	4.70	3.76	0.53	0.42	0.18	0.22	5.09
East	**G2/5-10**	41.2	5.2	0.11	1.26	5.28	8.14	2.03	4.66	2.79	2.70	1.21	0.14	0.20	0.08	0.17	2.44
East	**H2/5-10**	51.2	5.6	0.22	1.98	15.27	19.84	5.24	2.08	1.09	2.14	4.10	0.39	0.49	0.22	0.08	14.30
East	**I2/5-10**	42.0	5.0	0.14	2.70	9.64	6.94	2.60	2.44	1.29	0.20	4.27	0.25	0.17	0.11	0.09	5.83
East	**J2/5-10**	38.4	5.7	0.13	0.99	8.23	11.45	3.08	4.27	2.66	1.13	1.91	0.21	0.29	0.13	0.16	3.94
East	**K2/5-10**	39.2	5.1	0.09	1.15	3.98	6.08	1.66	2.61	1.59	0.56	1.11	0.10	0.15	0.07	0.10	3.33
East	**L2/5-10**	39.6	5.2	0.11	2.05	2.29	11.97	2.51	3.26	1.73	0.60	2.64	0.06	0.30	0.10	0.12	3.81
	Average	41.7	5.2	0.14	1.74	7.31	12.33	2.94	3.91	2.21	1.90	2.61	0.19	0.31	0.12	0.14	5.26
	SD	3.96	0.31	0.05	0.57	5.49	4.22	1.02	1.75	0.99	1.39	1.15	0.14	0.11	0.04	0.06	3.85
	CV	0.09	0.06	0.32	0.33	0.75	0.34	0.35	0.45	0.45	0.73	0.44	0.75	0.34	0.35	0.45	0.73

Appendix Table A2. Concluded

Sub-site Subplot/	Layer	Sat'n (%)	pH (Ext.)	E.C. (dS/m)	Na	K	Ca	Mg	Al	Fe	Mn	S	K	Ca	Mg	Al	BC:Al
					(mg/L)								(mmol/L)				
West	A2/10-15	37.2	4.7	0.07	0.88	1.91	6.43	1.10	2.00	1.16	0.41	0.63	0.05	0.16	0.05	0.07	3.44
West	B2/10-15	36.4	4.9	0.05	0.56	1.99	5.95	1.01	1.88	1.16	0.02	0.53	0.05	0.15	0.04	0.07	3.47
West	C2/10-15	37.6	4.8	0.07	0.75	3.75	6.41	1.32	3.77	1.99	0.13	0.99	0.10	0.16	0.05	0.14	2.22
West	D2/10-15	38.0	5.4	0.09	0.83	2.26	9.09	1.29	4.13	2.55	0.84	0.78	0.06	0.23	0.05	0.15	2.21
West	E2/10-15	36.8	5.4	0.11	0.82	3.93	8.58	1.82	3.00	1.83	0.51	0.95	0.10	0.21	0.07	0.11	3.50
West	F2/10-15	37.2	5.0	0.09	0.88	3.68	3.39	0.78	2.16	1.08	0.35	0.47	0.09	0.08	0.03	0.08	2.63
West	G2/10-15	37.6	5.6	0.12	1.30	4.27	11.13	2.60	2.84	1.69	0.89	1.41	0.11	0.28	0.11	0.11	4.69
West	H2/10-15	37.2	5.4	0.09	1.14	5.11	6.39	1.60	2.06	1.04	0.17	0.78	0.13	0.16	0.07	0.08	4.67
West	I2/10-15	36.8	5.9	0.09	0.71	2.39	9.41	1.94	8.52	4.38	0.07	0.83	0.06	0.23	0.08	0.32	1.19
West	J2/10-15	36.8	5.1	0.09	1.07	2.12	2.52	0.69	0.47	0.12	0.15	0.44	0.05	0.06	0.03	0.02	8.39
West	K2/10-15	37.2	5.5	0.09	1.07	2.95	7.36	1.12	1.45	0.61	0.18	0.74	0.08	0.18	0.05	0.05	5.68
West	L2/10-15	36.8	5.6	0.10	1.04	4.07	8.39	2.35	5.45	2.88	0.38	1.25	0.10	0.21	0.10	0.20	2.03
	Average	37.1	5.3	0.09	0.92	3.20	7.09	1.47	3.14	1.71	0.34	0.82	0.08	0.18	0.06	0.12	3.68
	SD	0.45	0.37	0.02	0.21	1.07	2.47	0.60	2.15	1.15	0.29	0.30	0.03	0.06	0.02	0.08	1.97
	CV	0.01	0.07	0.20	0.23	0.33	0.35	0.41	0.68	0.67	0.84	0.36	0.33	0.35	0.41	0.68	0.54
East	A2/10-15	37.8	5.3	0.09	1.37	3.02	6.30	1.34	2.05	1.18	0.26	1.00	0.08	0.16	0.06	0.08	3.82
East	B2/10-15	38.8	5.1	0.13	1.94	5.33	12.04	2.19	2.34	1.25	1.42	2.40	0.14	0.30	0.09	0.09	6.09
East	C2/10-15	36.4	5.2	0.11	2.21	1.72	7.55	2.16	0.73	0.27	0.86	3.28	0.04	0.19	0.09	0.03	11.84
East	D2/10-15	38.0	5.2	0.15	2.29	3.13	14.63	3.03	6.85	3.56	1.76	2.36	0.08	0.36	0.12	0.25	2.24
East	E2/10-15	37.2	5.1	0.12	2.04	3.35	11.00	2.22	4.09	2.40	0.74	1.21	0.09	0.27	0.09	0.15	2.98
East	F2/10-15	38.4	5.1	0.15	1.88	9.60	7.53	2.15	3.61	1.70	1.90	1.97	0.25	0.19	0.09	0.13	3.90
East	G2/10-15	38.8	5.0	0.09	1.57	2.24	4.59	1.27	1.55	0.82	0.49	0.76	0.06	0.11	0.05	0.06	3.91
East	H2/10-15	40.4	5.3	0.16	2.56	10.58	9.65	2.94	2.62	1.32	1.63	3.47	0.27	0.24	0.12	0.10	6.52
East	I2/10-15	37.6	4.9	0.12	3.30	4.95	4.94	2.11	1.19	0.51	0.11	3.68	0.13	0.12	0.09	0.04	7.65
East	J2/10-15	37.6	4.9	0.09	1.80	3.65	7.76	2.50	5.16	2.82	0.16	1.64	0.09	0.19	0.10	0.19	2.04
East	K2/10-15	36.8	5.0	0.07	1.00	2.35	3.71	1.20	1.91	1.25	0.16	0.87	0.06	0.09	0.05	0.07	2.85
East	L2/10-15	37.6	5.0	0.09	2.83	1.88	6.09	1.95	1.98	0.97	0.19	1.90	0.05	0.15	0.08	0.07	3.82
	Average	38.0	5.1	0.11	2.07	4.32	7.98	2.09	2.84	1.50	0.81	2.04	0.11	0.20	0.09	0.11	4.80
	SD	1.06	0.13	0.03	0.63	2.92	3.28	0.59	1.78	0.97	0.69	1.02	0.07	0.08	0.02	0.07	2.81
	CV	0.03	0.03	0.26	0.31	0.68	0.41	0.28	0.63	0.65	0.86	0.50	0.68	0.41	0.28	0.63	0.59

Appendix Table A3. Total Carbon, Nitrogen and Sulphur - Data and Descriptive Statistics

Site	Sub-site	Subplot/ Layer	pHc *	Total C (%)	Total N (%)	Total S (%)	C:N Ratio	C:S Ratio	N:S Ratio
ML	West	A2/LFH	3.7	39.9	0.90	0.079	45	505	11
ML	West	B2/LFH	3.8	21.0	0.68	0.062	31	339	11
ML	West	C2/LFH	3.8	34.0	0.87	0.072	39	472	12
ML	West	D2/LFH	3.5	39.8	1.07	0.096	37	415	11
ML	West	E2/LFH	3.6	35.2	0.96	0.095	37	371	10
ML	West	F2/LFH	3.9	13.5	0.42	0.035	32	386	12
ML	West	G2/LFH	3.9	51.4	1.19	0.098	43	524	12
ML	West	H2/LFH	3.8	27.4	0.94	0.082	29	334	11
ML	West	I2/LFH	3.9	30.9	0.87	0.066	35	468	13
ML	West	J2/LFH	3.8	25.6	0.71	0.056	36	457	13
ML	West	K2/LFH	3.9	25.6	0.89	0.078	29	328	11
ML	West	L2/LFH	3.9	48.2	1.44	0.134	33	360	11
		Mean	3.79	32.70	0.91	0.08	36	413	11.6
		SD	0.13	11.03	0.26	0.03	5.0	70	0.9
		CV	0.03	0.34	0.28	0.32	0.14	0.17	0.07
ML	East	A2/LFH	4.1	40.0	1.01	0.084	40	476	12
ML	East	B2/LFH	4.0	41.9	1.35	0.115	31	364	12
ML	East	C2/LFH	4.3	29.2	1.08	0.095	27	307	11
ML	East	D2/LFH	3.9	37.8	1.23	0.112	31	338	11
ML	East	E2/LFH	4.2	40.5	1.00	0.081	41	500	12
ML	East	F2/LFH	4.3	29.8	0.83	0.075	36	397	11
ML	East	G2/LFH	4.2	29.8	1.02	0.082	29	363	12
ML	East	H2/LFH	4.2	45.6	1.31	0.111	35	411	12
ML	East	I2/LFH	4.3	40.9	1.23	0.115	33	356	11
ML	East	J2/LFH	4.1	40.3	1.17	0.111	34	363	11
ML	East	K2/LFH	4.3	33.4	0.89	0.075	37	445	12
ML	East	L2/LFH	4.2	45.0	1.21	0.110	37	409	11
		Mean	4.18	37.85	1.11	0.10	34	394	11.5
		SD	0.13	5.87	0.17	0.02	4.2	57	0.6
		CV	0.03	0.16	0.15	0.17	0.12	0.15	0.06

* pHc of LFH layer is included in this table. pHc of all other layers are included in Table A1.

Appendix Table A3. Continued

Site	Sub-site	Subplot/ Layer	Total C (%)	Total N (%)	Total S (%)	C:N Ratio	C:S Ratio	N:S Ratio
ML	**West**	**A2/0-2**	2.25	0.08	0.002	28	1125	40
ML	**West**	**B2/0-2**	1.81	0.07	0.004	25	453	18
ML	**West**	**C2/0-2**	1.20	0.05	0.004	23	300	13
ML	**West**	**D2/0-2**	3.50	0.11	0.007	32	500	15
ML	**West**	**E2/0-2**	1.12	0.05	0.004	22	280	13
ML	**West**	**F2/0-2**	0.80	0.04	0.003	20	266	13
ML	**West**	**G2/0-2**	3.37	0.13	0.004	27	843	32
ML	**West**	**H2/0-2**	1.62	0.07	0.005	22	324	15
ML	**West**	**I2/0-2**	2.88	0.11	0.004	26	720	27
ML	**West**	**J2/0-2**	1.81	0.08	0.002	24	905	38
ML	**West**	**K2/0-2**	1.84	0.09	0.006	20	307	15
ML	**West**	**L2/0-2**	1.76	0.09	0.005	20	352	18
		Mean	2.00	0.08	0.00	24	531	21.5
		SD	0.86	0.03	0.00	3.8	293	10.1
		CV	0.43	0.32	0.35	0.16	0.55	0.47
ML	**East**	**A2/0-2**	2.74	0.10	0.004	27	685	26
ML	**East**	**B2/0-2**	2.85	0.12	0.009	24	317	13
ML	**East**	**C2/0-2**	5.07	0.22	0.015	23	338	15
ML	**East**	**D2/0-2**	1.84	0.08	0.002	22	920	41
ML	**East**	**E2/0-2**	3.43	0.12	0.007	28	490	17
ML	**East**	**F2/0-2**	3.09	0.13	0.009	24	343	14
ML	**East**	**G2/0-2**	2.34	0.11	0.006	21	390	18
ML	**East**	**H2/0-2**	2.12	0.11	0.007	20	303	15
ML	**East**	**I2/0-2**	2.38	0.10	0.008	23	298	13
ML	**East**	**J2/0-2**	4.65	0.19	0.013	24	358	15
ML	**East**	**K2/0-2**	2.29	0.10	0.010	24	229	10
ML	**East**	**L2/0-2**	4.96	0.16	0.006	32	827	26
		Mean	3.15	0.13	0.01	24	458	18.6
		SD	1.14	0.04	0.00	3.1	227	8.6
		CV	0.36	0.32	0.45	0.13	0.50	0.46

Appendix Table A3. Continued

Site	Sub-site	Subplot/ Layer	Total C (%)	Total N (%)	Total S (%)	C:N Ratio	C:S Ratio	N:S Ratio
ML	**West**	**A2/2-5**	1.10	0.04	0.001	25	1100	44
ML	**West**	**B2/2-5**	0.62	0.03	0.002	20	311	16
ML	**West**	**C2/2-5**	0.39	0.03	0.002	14	194	14
ML	**West**	**D2/2-5**	1.33	0.04	0.001	32	1330	41
ML	**West**	**E2/2-5**	0.73	0.04	0.003	19	244	13
ML	**West**	**F2/2-5**	0.55	0.03	0.002	18	273	16
ML	**West**	**G2/2-5**	1.68	0.06	0.002	27	840	31
ML	**West**	**H2/2-5**	0.73	0.04	0.001	19	733	38
ML	**West**	**I2/2-5**	1.69	0.07	0.005	26	338	13
ML	**West**	**J2/2-5**	0.86	0.04	0.003	24	285	12
ML	**West**	**K2/2-5**	0.92	0.06	0.002	17	460	28
ML	**West**	**L2/2-5**	0.72	0.05	0.002	14	359	25
		Mean	0.94	0.04	0.00	21	539	24.1
		SD	0.43	0.01	0.00	5.6	374	12.0
		CV	0.45	0.29	0.51	0.26	0.69	0.50
ML	**East**	**A2/2-5**	1.15	0.06	0.001	19	1150	60
ML	**East**	**B2/2-5**	2.04	0.09	0.007	22	291	13
ML	**East**	**C2/2-5**	1.14	0.06	0.004	18	285	16
ML	**East**	**D2/2-5**	1.21	0.05	0.001	22	1210	54
ML	**East**	**E2/2-5**	1.87	0.08	0.005	23	374	17
ML	**East**	**F2/2-5**	1.39	0.07	0.005	21	278	13
ML	**East**	**G2/2-5**	2.13	0.09	0.007	24	304	13
ML	**East**	**H2/2-5**	1.95	0.08	0.006	25	325	13
ML	**East**	**I2/2-5**	0.56	0.04	0.003	14	186	14
ML	**East**	**J2/2-5**	1.57	0.07	0.006	21	262	12
ML	**East**	**K2/2-5**	0.64	0.04	0.003	17	215	13
ML	**East**	**L2/2-5**	0.98	0.04	0.001	23	979	42
		Mean	1.39	0.07	0.00	21	488	23.3
		SD	0.53	0.02	0.00	3.3	383	17.8
		CV	0.38	0.29	0.56	0.16	0.78	0.77

Appendix Table A3. Continued

Site	Sub-site	Subplot/ Layer	Total C (%)	Total N (%)	Total S (%)	C:N Ratio	C:S Ratio	N:S Ratio
ML	**West**	**A2/5-10**	0.43	0.02	0.001	18	426	24
ML	**West**	**B2/5-10**	0.30	0.03	0.001	12	301	25
ML	**West**	**C2/5-10**	0.30	0.02	0.002	13	152	12
ML	**West**	**D2/5-10**	0.63	0.02	0.001	27	630	23
ML	**West**	**E2/5-10**	0.43	0.03	0.003	15	143	10
ML	**West**	**F2/5-10**	0.32	0.02	0.001	13	315	24
ML	**West**	**G2/5-10**	0.75	0.03	0.001	26	748	29
ML	**West**	**H2/5-10**	0.38	0.03	0.001	15	381	25
ML	**West**	**I2/5-10**	0.49	0.03	0.002	15	246	17
ML	**West**	**J2/5-10**	0.34	0.02	0.001	16	337	21
ML	**West**	**K2/5-10**	0.40	0.03	0.002	12	200	17
ML	**West**	**L2/5-10**	0.35	0.03	0.002	10	175	17
		Mean	0.43	0.03	0.00	16	338	20.2
		SD	0.14	0.00	0.00	5.4	189	5.8
		CV	0.32	0.17	0.45	0.34	0.56	0.28
ML	**East**	**A2/5-10**	0.55	0.05	0.002	12	273	23
ML	**East**	**B2/5-10**	0.85	0.06	0.004	15	213	14
ML	**East**	**C2/5-10**	0.67	0.04	0.003	16	225	14
ML	**East**	**D2/5-10**	1.18	0.04	0.001	27	1180	43
ML	**East**	**E2/5-10**	0.62	0.04	0.002	16	312	20
ML	**East**	**F2/5-10**	0.86	0.04	0.004	20	215	11
ML	**East**	**G2/5-10**	0.79	0.04	0.003	18	262	15
ML	**East**	**H2/5-10**	1.74	0.07	0.006	24	290	12
ML	**East**	**I2/5-10**	0.41	0.03	0.002	13	203	16
ML	**East**	**J2/5-10**	0.67	0.04	0.003	17	223	13
ML	**East**	**K2/5-10**	0.35	0.02	0.002	15	174	12
ML	**East**	**L2/5-10**	0.36	0.03	0.001	12	357	29
		Mean	0.75	0.04	0.00	17	327	18.4
		SD	0.39	0.01	0.00	4.8	274	9.4
		CV	0.52	0.30	0.52	0.28	0.84	0.51

Appendix Table A3. Continued

Site	Sub-site	Subplot/ Layer	Total C (%)	Total N (%)	Total S (%)	C:N Ratio	C:S Ratio	N:S Ratio
ML	**West**	**A2/10-15**	0.28	0.02	0.001	13	275	21
ML	**West**	**B2/10-15**	0.23	0.03	0.001	9	233	26
ML	**West**	**C2/10-15**	0.24	0.02	0.001	10	236	23
ML	**West**	**D2/10-15**	0.42	0.02	0.001	18	420	23
ML	**West**	**E2/10-15**	0.32	0.03	0.002	12	158	13
ML	**West**	**F2/10-15**	0.27	0.02	0.001	15	274	18
ML	**West**	**G2/10-15**	0.45	0.03	0.001	18	446	25
ML	**West**	**H2/10-15**	0.21	0.02	0.001	13	214	16
ML	**West**	**I2/10-15**	0.21	0.02	0.001	9	212	24
ML	**West**	**J2/10-15**	0.24	0.02	0.001	12	235	19
ML	**West**	**K2/10-15**	0.24	0.03	0.001	8	243	29
ML	**West**	**L2/10-15**	0.26	0.03	0.001	10	259	25
		Mean	0.28	0.02	0.00	12	267	21.8
		SD	0.08	0.00	0.00	3.3	84	4.6
		CV	0.28	0.16	0.27	0.27	0.31	0.21
ML	**East**	**A2/10-15**	0.41	0.04	0.001	11	408	36
ML	**East**	**B2/10-15**	0.44	0.03	0.001	13	438	33
ML	**East**	**C2/10-15**	0.26	0.03	0.001	9	262	28
ML	**East**	**D2/10-15**	0.90	0.05	0.001	18	896	50
ML	**East**	**E2/10-15**	0.30	0.02	0.001	15	304	20
ML	**East**	**F2/10-15**	0.31	0.02	0.001	15	305	21
ML	**East**	**G2/10-15**	0.28	0.03	0.002	9	141	16
ML	**East**	**H2/10-15**	0.67	0.04	0.003	19	223	12
ML	**East**	**I2/10-15**	0.25	0.03	0.002	10	124	13
ML	**East**	**J2/10-15**	0.33	0.03	0.003	11	111	10
ML	**East**	**K2/10-15**	0.24	0.03	0.001	8	236	28
ML	**East**	**L2/10-15**	0.22	0.02	0.001	11	224	20
		Mean	0.38	0.03	0.00	12	306	23.9
		SD	0.20	0.01	0.00	3.5	212	11.7
		CV	0.53	0.28	0.53	0.28	0.69	0.49

APPENDIX B

LABORATORY DATA

MOOSE LAKE SOIL MONITORING SITE - 2014

APPENDIX TABLE B1

SAMPLE IDENTIFICATION

Table A1. Lab Report - Sample Identification

Project: Permanent Site -Acid Deposition -Moose Lake
Project Leader: Salim Abboud; Project Contact: Larry Turchenek
Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	East	A2/LFH	385
	Moose Lake	East	A2/0-2	386
	Moose Lake	East	A2/2-5	387
	Moose Lake	East	A2/5-10	388
	Moose Lake	East	A2/10-15	389
	Moose Lake	East	A2/15-30	390
	Moose Lake	East	A2/30-45	391
	Moose Lake	East	A2/45-60	392
	Moose Lake	East	B2/LFH	393
	Moose Lake	East	B2/0-2	394
	Moose Lake	East	B2/2-5	395
	Moose Lake	East	B2/5-10	396
	Moose Lake	East	B2/10-15	397
	Moose Lake	East	B2/15-30	398
	Moose Lake	East	B2/30-45	399
	Moose Lake	East	B2/45-60	400
	Moose Lake	East	C2/LFH	401
	Moose Lake	East	C2/0-2	402
	Moose Lake	East	C2/2-5	403
	Moose Lake	East	C2/5-10	404
	Moose Lake	East	C2/10-15	405
	Moose Lake	East	C2/15-30	406
	Moose Lake	East	C2/30-45	407
	Moose Lake	East	C2/45-60	408
	Moose Lake	East	D2/LFH	409
	Moose Lake	East	D2/0-2	410
	Moose Lake	East	D2/2-5	411
	Moose Lake	East	D2/5-10	412
	Moose Lake	East	D2/10-15	413
	Moose Lake	East	D2/15-30	414
	Moose Lake	East	D2/30-45	415
	Moose Lake	East	D2/45-60	416

Project: Permanent Site -Acid Deposition -Moose Lake
Project Leader: Salim Abboud; Project Contact: Larry Turchenek
Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	East	E2/LFH	417
	Moose Lake	East	E2/0-2	418
	Moose Lake	East	E2/2-5	419
	Moose Lake	East	E2/5-10	420
	Moose Lake	East	E2/10-15	421
	Moose Lake	East	E2/15-30	422
	Moose Lake	East	E2/30-45	423
	Moose Lake	East	E2/45-60	424
	Moose Lake	East	F2/LFH	425
	Moose Lake	East	F2/0-2	426
	Moose Lake	East	F2/2-5	427
	Moose Lake	East	F2/5-10	428
	Moose Lake	East	F2/10-15	429
	Moose Lake	East	F2/15-30	430
	Moose Lake	East	F2/30-45	431
	Moose Lake	East	F2/45-60	432
	Moose Lake	East	G2/LFH	433
	Moose Lake	East	G2/0-2	434
	Moose Lake	East	G2/2-5	435
	Moose Lake	East	G2/5-10	436
	Moose Lake	East	G2/10-15	437
	Moose Lake	East	G2/15-30	438
	Moose Lake	East	G2/30-45	439
	Moose Lake	East	G2/45-60	440
	Moose Lake	East	H2/LFH	441
	Moose Lake	East	H2/0-2	442
	Moose Lake	East	H2/2-5	443
	Moose Lake	East	H2/5-10	444
	Moose Lake	East	H2/10-15	445
	Moose Lake	East	H2/15-30	446
	Moose Lake	East	H2/30-45	447
	Moose Lake	East	H2/45-60	448
	Moose Lake	East	I2/LFH	449
	Moose Lake	East	I2/0-2	450
	Moose Lake	East	I2/2-5	451

Project: Permanent Site -Acid Deposition -Moose Lake
Project Leader: Salim Abboud; Project Contact: Larry Turchenek
Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	East	I2/5-10	452
	Moose Lake	East	I2/10-15	453
	Moose Lake	East	I2/15-30	454
	Moose Lake	East	I2/30-45	455
	Moose Lake	East	I2/45-60	456
	Moose Lake	East	J2/LFH	457
	Moose Lake	East	J2/0-2	458
	Moose Lake	East	J2/2-5	459
	Moose Lake	East	J2/5-10	460
	Moose Lake	East	J2/10-15	461
	Moose Lake	East	J2/15-30	462
	Moose Lake	East	J2/30-45	463
	Moose Lake	East	J2/45-60	464
	Moose Lake	East	K2/LFH	465
	Moose Lake	East	K2/0-2	466
	Moose Lake	East	K2/2-5	467
	Moose Lake	East	K2/5-10	468
	Moose Lake	East	K2/10-15	469
	Moose Lake	East	K2/15-30	470
	Moose Lake	East	K2/30-45	471
	Moose Lake	East	K2/45-60	472
	Moose Lake	East	L2/LFH	473
	Moose Lake	East	L2/0-2	474
	Moose Lake	East	L2/2-5	475
	Moose Lake	East	L2/5-10	476
	Moose Lake	East	L2/10-15	477
	Moose Lake	East	L2/15-30	478
	Moose Lake	East	L2/30-45	479
	Moose Lake	East	L2/45-60	480
	Moose Lake	West	A2/LFH	481
	Moose Lake	West	A2/0-2	482
	Moose Lake	West	A2/2-5	483
	Moose Lake	West	A2/5-10	484
	Moose Lake	West	A2/10-15	485
	Moose Lake	West	A2/15-30	486

Project: Permanent Site -Acid Deposition -Moose Lake
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Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	West	A2/30-45	487
	Moose Lake	West	A2/45-60	488
	Moose Lake	West	B2/LFH	489
	Moose Lake	West	B2/0-2	490
	Moose Lake	West	B2/2-5	491
	Moose Lake	West	B2/5-10	492
	Moose Lake	West	B2/10-15	493
	Moose Lake	West	B2/15-30	494
	Moose Lake	West	B2/30-45	495
	Moose Lake	West	B2/45-60	496
	Moose Lake	West	C2/LFH	497
	Moose Lake	West	C2/0-2	498
	Moose Lake	West	C2/2-5	499
	Moose Lake	West	C2/5-10	500
	Moose Lake	West	C2/10-15	501
	Moose Lake	West	C2/15-30	502
	Moose Lake	West	C2/30-45	503
	Moose Lake	West	C2/45-60	504
	Moose Lake	West	D2/LFH	505
	Moose Lake	West	D2/0-2	506
	Moose Lake	West	D2/2-5	507
	Moose Lake	West	D2/5-10	508
	Moose Lake	West	D2/10-15	509
	Moose Lake	West	D2/15-30	510
	Moose Lake	West	D2/30-45	511
	Moose Lake	West	D2/45-60	512
	Moose Lake	West	E2/LFH	513
	Moose Lake	West	E2/0-2	514
	Moose Lake	West	E2/2-5	515
	Moose Lake	West	E2/5-10	516
	Moose Lake	West	E2/10-15	517
	Moose Lake	West	E2/15-30	518
	Moose Lake	West	E2/30-45	519
	Moose Lake	West	E2/45-60	520
	Moose Lake	West	F2/LFH	521

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Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	West	F2/0-2	522
	Moose Lake	West	F2/2-5	523
	Moose Lake	West	F2/5-10	524
	Moose Lake	West	F2/10-15	525
	Moose Lake	West	F2/15-30	526
	Moose Lake	West	F2/30-45	527
	Moose Lake	West	F2/45-60	528
	Moose Lake	West	G2/LFH	529
	Moose Lake	West	G2/0-2	530
	Moose Lake	West	G2/2-5	531
	Moose Lake	West	G2/5-10	532
	Moose Lake	West	G2/10-15	533
	Moose Lake	West	G2/15-30	534
	Moose Lake	West	G2/30-45	535
	Moose Lake	West	G2/45-60	536
	Moose Lake	West	H2/LFH	537
	Moose Lake	West	H2/0-2	538
	Moose Lake	West	H2/2-5	539
	Moose Lake	West	H2/5-10	540
	Moose Lake	West	H2/10-15	541
	Moose Lake	West	H2/15-30	542
	Moose Lake	West	H2/30-45	543
	Moose Lake	West	H2/45-60	544
	Moose Lake	West	I2/LFH	545
	Moose Lake	West	I2/0-2	546
	Moose Lake	West	I2/2-5	547
	Moose Lake	West	I2/5-10	548
	Moose Lake	West	I2/10-15	549
	Moose Lake	West	I2/15-30	550
	Moose Lake	West	I2/30-45	551
	Moose Lake	West	I2/45-60	552
	Moose Lake	West	J2/LFH	553
	Moose Lake	West	J2/0-2	554
	Moose Lake	West	J2/2-5	555
	Moose Lake	West	J2/5-10	556

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Project Leader: Salim Abboud; Project Contact: Larry Turchenek
Date Received: Oct. 14, 2014

Date Sampled	Site	Plot	Field Id.	Lab I.D. (2014)
Oct. 11-12, 2014	Moose Lake	West	J2/10-15	557
	Moose Lake	West	J2/15-30	558
	Moose Lake	West	J2/30-45	559
	Moose Lake	West	J2/45-60	560
	Moose Lake	West	K2/LFH	561
	Moose Lake	West	K2/0-2	562
	Moose Lake	West	K2/2-5	563
	Moose Lake	West	K2/5-10	564
	Moose Lake	West	K2/10-15	565
	Moose Lake	West	K2/15-30	566
	Moose Lake	West	K2/30-45	567
	Moose Lake	West	K2/45-60	568
	Moose Lake	West	L2/LFH	569
	Moose Lake	West	L2/0-2	570
	Moose Lake	West	L2/2-5	571
	Moose Lake	West	L2/5-10	572
	Moose Lake	West	L2/10-15	573
	Moose Lake	West	L2/15-30	574
	Moose Lake	West	L2/30-45	575
	Moose Lake	West	L2/45-60	576

APPENDIX TABLE B2

pH, CATION EXCHANGE CAPACITY AND EXCHANGEABLE CATIONS

Appendix Table B2. Lab Report - pH, Cation Exchange Capacity and Exchangeable Cations

Site	Plot	Field ID	Lab ID	pH	Na	K	Ca	Mg	Al	Fe	Mn	TEC	Base Cat.	Base	Total C	Total N	Total S	C:N	C:S	N:S
			(2014)	(CaCl2)	(cmol/kg)									Saturation	(%)	(%)	(%)	Ratio	Ratio	Ratio
Moose Lake	**East**	**A2/LFH**	**385**	4.1											40.0	1.01	0.084	40	476	12
Moose Lake	**East**	**A2/0-2**	**386**	4.3	0.144	0.170	2.89	0.285	0.743	0.019	0.789	5.04	3.49	0.69	2.74	0.10	0.004	27	685	26
Moose Lake	**East**	**A2/2-5**	**387**	4.5	0.141	0.085	1.83	0.175	0.480	<0.001	0.228	2.94	2.23	0.76	1.15	0.06	0.001	19	1150	60
Moose Lake	**East**	**A2/5-10**	**388**	4.7	0.141	0.054	0.601	0.071	0.171	<0.001	0.023	1.06	0.87	0.82	0.55	0.05	0.002	12	273	23
Moose Lake	**East**	**A2/10-15**	**389**	4.8	0.140	0.049	0.387	0.045	0.133	<0.001	0.009	0.764	0.62	0.81	0.41	0.04	0.001	11	408	36
Moose Lake	**East**	**B2/LFH**	**393**	4.0											41.9	1.35	0.115	31	364	12
Moose Lake	**East**	**B2/0-2**	**394**	4.4	0.138	0.130	2.75	0.264	0.746	0.001	0.430	4.46	3.28	0.74	2.85	0.12	0.009	24	317	13
Moose Lake	**East**	**B2/2-5**	**395**	4.7	0.142	0.087	2.90	0.210	0.403	<0.001	0.279	4.03	3.34	0.83	2.04	0.09	0.007	22	291	13
Moose Lake	**East**	**B2/5-10**	**396**	4.6	0.168	0.081	1.09	0.157	0.388	0.014	0.162	2.06	1.50	0.73	0.85	0.06	0.004	15	213	14
Moose Lake	**East**	**B2/10-15**	**397**	4.7	0.167	0.064	0.769	0.119	0.251	0.017	0.046	1.43	1.12	0.78	0.44	0.03	0.001	13	438	33
Moose Lake	**East**	**C2/LFH**	**401**	4.3											29.2	1.08	0.095	27	307	11
Moose Lake	**East**	**C2/0-2**	**402**	4.7	0.161	0.154	11.1	1.01	0.213	0.013	0.568	13.2	12.44	0.94	5.07	0.22	0.015	23	338	15
Moose Lake	**East**	**C2/2-5**	**403**	4.9	0.170	0.072	2.91	0.333	0.103	0.012	0.208	3.81	3.48	0.91	1.14	0.06	0.004	18	285	16
Moose Lake	**East**	**C2/5-10**	**404**	4.9	0.167	0.039	0.800	0.140	0.114	0.013	0.090	1.36	1.15	0.84	0.67	0.04	0.003	16	225	14
Moose Lake	**East**	**C2/10-15**	**405**	4.7	0.166	0.031	0.367	0.107	0.111	0.018	0.022	0.822	0.67	0.82	0.26	0.03	0.001	9	262	28
Moose Lake	**East**	**D2/LFH**	**409**	3.9											37.8	1.23	0.112	31	338	11
Moose Lake	**East**	**D2/0-2**	**410**	4.8	0.169	0.115	3.54	0.385	0.107	0.014	0.137	4.47	4.21	0.94	1.84	0.08	0.002	22	920	41
Moose Lake	**East**	**D2/2-5**	**411**	5.1	0.161	0.074	2.96	0.314	0.068	0.014	0.103	3.69	3.51	0.95	1.21	0.05	0.001	22	1210	54
Moose Lake	**East**	**D2/5-10**	**412**	4.9	0.164	0.059	2.04	0.251	0.148	0.014	0.073	2.75	2.51	0.91	1.18	0.04	0.001	27	1180	43
Moose Lake	**East**	**D2/10-15**	**413**	4.7	0.165	0.038	1.14	0.175	0.238	0.014	0.068	1.83	1.51	0.83	0.90	0.05	0.001	18	896	50
Moose Lake	**East**	**E2/LFH**	**417**	4.2											40.5	1.00	0.081	41	500	12
Moose Lake	**East**	**E2/0-2**	**418**	4.1	0.170	0.150	2.57	0.342	0.658	0.020	0.520	4.43	3.23	0.73	3.43	0.12	0.007	28	490	17
Moose Lake	**East**	**E2/2-5**	**419**	4.6	0.178	0.065	2.84	0.286	0.309	0.013	0.212	3.90	3.37	0.86	1.87	0.08	0.005	23	374	17
Moose Lake	**East**	**E2/5-10**	**420**	4.6	0.165	0.050	1.05	0.162	0.212	0.015	0.072	1.73	1.43	0.83	0.62	0.04	0.002	16	312	20
Moose Lake	**East**	**E2/10-15**	**421**	4.6	0.165	0.036	0.644	0.123	0.175	0.022	0.020	1.19	0.97	0.82	0.30	0.02	0.001	15	304	20
Moose Lake	**East**	**F2/LFH**	**425**	4.3											29.8	0.83	0.075	36	397	11
Moose Lake	**East**	**F2/0-2**	**426**	4.8	0.159	0.164	4.85	0.576	0.133	0.012	0.309	6.20	5.75	0.93	3.09	0.13	0.009	24	343	14
Moose Lake	**East**	**F2/2-5**	**427**	4.7	0.159	0.134	2.40	0.335	0.237	0.014	0.195	3.47	3.02	0.87	1.39	0.07	0.005	21	278	13
Moose Lake	**East**	**F2/5-10**	**428**	4.5	0.160	0.101	1.01	0.173	0.318	0.014	0.138	1.92	1.45	0.75	0.86	0.04	0.004	20	215	11
Moose Lake	**East**	**F2/10-15**	**429**	4.4	0.167	0.074	0.351	0.095	0.276	0.016	0.039	1.02	0.69	0.67	0.31	0.02	0.001	15	305	21
Moose Lake	**East**	**G2/LFH**	**433**	4.2											29.8	1.02	0.082	29	363	12
Moose Lake	**East**	**G2/0-2**	**434**	4.4	0.163	0.140	2.50	0.334	0.508	0.019	0.362	4.03	3.14	0.78	2.34	0.11	0.006	21	390	18
Moose Lake	**East**	**G2/2-5**	**435**	4.5	0.165	0.088	3.23	0.326	0.596	0.014	0.339	4.76	3.81	0.80	2.13	0.09	0.007	24	304	13

Site	Plot	Field ID	Lab ID	pH	Na	K	Ca	Mg	Al	Fe	Mn	TEC	Base Cat.	Base	Total C	Total N	Total S	C:N	C:S	N:S
			(2014)	(CaCl2)	(cmol/kg)									Saturation	(%)	(%)	(%)	Ratio	Ratio	Ratio
Moose Lake	**East**	**H2/LFH**	**441**	4.2											45.6	1.31	0.111	35	411	12
Moose Lake	**East**	**H2/0-2**	**442**	4.8	0.159	0.113	3.42	0.435	0.124	0.013	0.162	4.43	4.13	0.93	2.12	0.11	0.007	20	303	15
Moose Lake	**East**	**H2/2-5**	**443**	4.8	0.163	0.167	3.48	0.478	0.205	0.013	0.186	4.69	4.29	0.91	1.95	0.08	0.006	25	325	13
Moose Lake	**East**	**H2/5-10**	**444**	4.7	0.163	0.137	3.10	0.432	0.316	0.013	0.214	4.37	3.83	0.88	1.74	0.07	0.006	24	290	12
Moose Lake	**East**	**H2/10-15**	**445**	4.6	0.164	0.072	0.625	0.133	0.246	0.014	0.051	1.30	0.99	0.76	0.67	0.04	0.003	19	223	12
Moose Lake	**East**	**I2/LFH**	**449**	4.3											40.9	1.23	0.115	33	356	11
Moose Lake	**East**	**I2/0-2**	**450**	4.4	0.164	0.169	2.54	0.400	0.431	0.027	0.255	3.99	3.28	0.82	2.38	0.10	0.008	23	298	13
Moose Lake	**East**	**I2/2-5**	**451**	4.5	0.171	0.105	0.748	0.183	0.324	0.041	0.055	1.63	1.21	0.74	0.56	0.04	0.003	14	186	14
Moose Lake	**East**	**I2/5-10**	**452**	4.4	0.165	0.078	0.352	0.118	0.347	0.040	0.007	1.11	0.71	0.64	0.41	0.03	0.002	13	203	16
Moose Lake	**East**	**I2/10-15**	**453**	4.4	0.167	0.056	0.230	0.097	0.336	0.031	0.005	0.923	0.55	0.60	0.25	0.03	0.002	10	124	13
Moose Lake	**East**	**J2/LFH**	**457**	4.1											40.3	1.17	0.111	34	363	11
Moose Lake	**East**	**J2/0-2**	**458**	4.7	0.162	0.142	9.58	1.017	0.200	0.012	0.297	11.4	10.90	0.96	4.65	0.19	0.013	24	358	15
Moose Lake	**East**	**J2/2-5**	**459**	4.7	0.163	0.106	3.28	0.421	0.245	0.012	0.145	4.38	3.97	0.91	1.57	0.07	0.006	21	262	12
Moose Lake	**East**	**J2/5-10**	**460**	4.6	0.164	0.082	1.32	0.259	0.235	0.013	0.074	2.14	1.82	0.85	0.67	0.04	0.003	17	223	13
Moose Lake	**East**	**J2/10-15**	**461**	4.4	0.165	0.048	0.660	0.191	0.332	0.027	0.015	1.44	1.06	0.74	0.33	0.03	0.003	11	111	10
Moose Lake	**East**	**K2/LFH**	**465**	4.3											33.4	0.89	0.075	37	445	12
Moose Lake	**East**	**K2/0-2**	**466**	4.3	0.163	0.127	2.46	0.292	0.326	0.023	0.302	3.69	3.04	0.82	2.29	0.10	0.010	24	229	10
Moose Lake	**East**	**K2/2-5**	**467**	4.5	0.162	0.060	0.742	0.129	0.261	0.017	0.078	1.45	1.09	0.75	0.64	0.04	0.003	17	215	13
Moose Lake	**East**	**K2/5-10**	**468**	4.5	0.161	0.042	0.355	0.083	0.230	0.037	0.016	0.923	0.64	0.69	0.35	0.02	0.002	15	174	12
Moose Lake	**East**	**K2/10-15**	**469**	4.5	0.162	0.037	0.219	0.067	0.232	0.031	0.006	0.754	0.49	0.64	0.24	0.03	0.001	8	236	28
Moose Lake	**East**	**L2/LFH**	**473**	4.2											45.0	1.21	0.110	37	409	11
Moose Lake	**East**	**L2/0-2**	**474**	4.3	0.171	0.200	6.76	0.626	0.537	0.025	0.720	9.04	7.76	0.86	4.96	0.16	0.006	32	827	26
Moose Lake	**East**	**L2/2-5**	**475**	4.9	0.165	0.051	2.46	0.240	0.105	0.014	0.097	3.14	2.92	0.93	0.98	0.04	0.001	23	979	42
Moose Lake	**East**	**L2/5-10**	**476**	4.7	0.168	0.041	0.748	0.131	0.189	0.024	0.024	1.32	1.09	0.82	0.36	0.03	0.001	12	357	29
Moose Lake	**East**	**L2/10-15**	**477**	4.6	0.171	0.034	0.323	0.098	0.206	0.030	0.007	0.869	0.63	0.72	0.22	0.02	0.001	11	224	20
Moose Lake	**West**	**A2/LFH**	**481**	3.7											39.9	0.90	0.079	45	505	11
Moose Lake	**West**	**A2/0-2**	**482**	4.0	0.166	0.066	2.16	0.169	0.884	0.016	0.439	3.90	2.56	0.66	2.25	0.08	0.002	28	1125	40
Moose Lake	**West**	**A2/2-5**	**483**	4.4	0.164	0.041	1.91	0.134	0.446	0.013	0.145	2.85	2.25	0.79	1.10	0.04	0.001	25	1100	44
Moose Lake	**West**	**A2/5-10**	**484**	4.5	0.165	0.030	0.68	0.089	0.224	0.015	0.034	1.24	0.97	0.78	0.43	0.02	0.001	18	426	24
Moose Lake	**West**	**A2/10-15**	**485**	4.5	0.166	0.032	0.442	0.075	0.231	0.021	0.015	0.982	0.72	0.73	0.28	0.02	0.001	13	275	21
Moose Lake	**West**	**B2/LFH**	**489**	3.8											21.0	0.68	0.062	31	339	11
Moose Lake	**West**	**B2/0-2**	**490**	4.3	0.161	0.092	1.93	0.187	0.619	0.013	0.213	3.22	2.37	0.74	1.81	0.07	0.004	25	453	18
Moose Lake	**West**	**B2/2-5**	**491**	4.5	0.161	0.055	0.717	0.103	0.297	0.013	0.060	1.41	1.04	0.74	0.62	0.03	0.002	20	311	16

Site	Plot	Field ID	Lab ID	pH	Na	K	Ca	Mg	Al	Fe	Mn	TEC	Base Cat.	Base	Total C	Total N	Total S	C:N	C:S	N:S
			(2014)	(CaCl2)	(cmol/kg)									Saturation	(%)	(%)	(%)	Ratio	Ratio	Ratio
Moose Lake	**West**	**C2/LFH**	**497**	3.8											34.0	0.87	0.072	39	472	12
Moose Lake	**West**	**C2/0-2**	**498**	4.5	0.162	0.062	1.93	0.240	0.469	0.012	0.188	3.07	2.40	0.78	1.20	0.05	0.004	23	300	13
Moose Lake	**West**	**C2/2-5**	**499**	4.6	0.163	0.057	0.789	0.159	0.190	0.013	0.042	1.41	1.17	0.83	0.39	0.03	0.002	14	194	14
Moose Lake	**West**	**C2/5-10**	**500**	4.5	0.160	0.056	0.601	0.127	0.279	0.018	0.021	1.26	0.94	0.75	0.30	0.02	0.002	13	152	12
Moose Lake	**West**	**C2/10-15**	**501**	4.6	0.161	0.056	0.619	0.121	0.227	0.023	0.008	1.22	0.96	0.79	0.24	0.02	0.001	10	236	23
Moose Lake	**West**	**D2/LFH**	**505**	3.5											39.8	1.07	0.096	37	415	11
Moose Lake	**West**	**D2/0-2**	**506**	4.1	0.180	0.180	2.23	0.202	1.096	0.049	0.871	4.81	2.79	0.58	3.50	0.11	0.007	32	500	15
Moose Lake	**West**	**D2/2-5**	**507**	4.4	0.165	0.051	1.73	0.103	0.536	0.014	0.165	2.77	2.05	0.74	1.33	0.04	0.001	32	1330	41
Moose Lake	**West**	**D2/5-10**	**508**	4.6	0.164	0.046	1.02	0.082	0.280	0.015	0.053	1.66	1.31	0.79	0.63	0.02	0.001	27	630	23
Moose Lake	**West**	**D2/10-15**	**509**	4.7	0.164	0.039	0.637	0.076	0.218	0.015	0.033	1.18	0.92	0.78	0.42	0.02	0.001	18	420	23
Moose Lake	**West**	**E2/LFH**	**513**	3.6											35.2	0.96	0.095	37	371	10
Moose Lake	**West**	**E2/0-2**	**514**	4.1	0.169	0.090	1.14	0.172	0.757	0.016	0.256	2.60	1.57	0.60	1.12	0.05	0.004	22	280	13
Moose Lake	**West**	**E2/2-5**	**515**	4.3	0.166	0.056	0.642	0.109	0.544	0.017	0.110	1.64	0.97	0.59	0.73	0.04	0.003	19	244	13
Moose Lake	**West**	**E2/5-10**	**516**	4.7	0.167	0.049	0.652	0.108	0.268	0.019	0.048	1.31	0.98	0.74	0.43	0.03	0.003	15	143	10
Moose Lake	**West**	**E2/10-15**	**517**	4.8	0.165	0.050	0.586	0.111	0.170	0.019	0.024	1.12	0.91	0.81	0.32	0.03	0.002	12	158	13
Moose Lake	**West**	**F2/LFH**	**521**	3.9											13.5	0.42	0.035	32	386	12
Moose Lake	**West**	**F2/0-2**	**522**	4.3	0.162	0.095	0.629	0.109	0.608	0.015	0.107	1.72	0.99	0.58	0.80	0.04	0.003	20	266	13
Moose Lake	**West**	**F2/2-5**	**523**	4.4	0.164	0.072	0.491	0.084	0.392	0.014	0.046	1.26	0.81	0.64	0.55	0.03	0.002	18	273	16
Moose Lake	**West**	**F2/5-10**	**524**	4.4	0.164	0.053	0.317	0.066	0.336	0.019	0.021	0.976	0.60	0.61	0.32	0.02	0.001	13	315	24
Moose Lake	**West**	**F2/10-15**	**525**	4.4	0.164	0.048	0.257	0.063	0.320	0.019	0.013	0.884	0.53	0.60	0.27	0.02	0.001	15	274	18
Moose Lake	**West**	**G2/LFH**	**529**	3.9											51.4	1.19	0.098	43	524	12
Moose Lake	**West**	**G2/0-2**	**530**	4.4	0.162	0.150	5.39	0.591	0.396	0.014	0.365	7.07	6.30	0.89	3.37	0.13	0.004	27	843	32
Moose Lake	**West**	**G2/2-5**	**531**	4.5	0.166	0.107	3.97	0.381	0.422	0.014	0.280	5.34	4.62	0.87	1.68	0.06	0.002	27	840	31
Moose Lake	**West**	**G2/5-10**	**532**	4.7	0.168	0.062	1.35	0.181	0.177	0.014	0.085	2.03	1.76	0.86	0.75	0.03	0.001	26	748	29
Moose Lake	**West**	**G2/10-15**	**533**	4.9	0.163	0.055	0.753	0.134	0.138	0.015	0.037	1.30	1.11	0.85	0.45	0.03	0.001	18	446	25
Moose Lake	**West**	**H2/LFH**	**537**	3.8											27.4	0.94	0.082	29	334	11
Moose Lake	**West**	**H2/0-2**	**538**	4.5	0.170	0.145	1.82	0.218	0.325	0.016	0.282	2.98	2.36	0.79	1.62	0.07	0.005	22	324	15
Moose Lake	**West**	**H2/2-5**	**539**	4.7	0.168	0.101	0.893	0.145	0.224	0.016	0.103	1.65	1.31	0.79	0.73	0.04	0.001	19	733	38
Moose Lake	**West**	**H2/5-10**	**540**	4.7	0.164	0.067	0.574	0.116	0.206	0.020	0.030	1.18	0.92	0.78	0.38	0.03	0.001	15	381	25
Moose Lake	**West**	**H2/10-15**	**541**	4.8	0.166	0.063	0.436	0.103	0.149	0.022	0.011	0.951	0.77	0.81	0.21	0.02	0.001	13	214	16
Moose Lake	**West**	**I2/LFH**	**545**	3.9											30.9	0.87	0.066	35	468	13
Moose Lake	**West**	**I2/0-2**	**546**	4.4	0.172	0.129	4.76	0.398	0.685	0.016	0.544	6.70	5.46	0.81	2.88	0.11	0.004	26	720	27
Moose Lake	**West**	**I2/2-5**	**547**	4.7	0.163	0.096	3.09	0.257	0.328	0.015	0.231	4.18	3.61	0.86	1.69	0.07	0.005	26	338	13

Site	Plot	Field ID	Lab ID	pH	Na	K	Ca	Mg	Al	Fe	Mn	TEC	Base Cat.	Base	Total C	Total N	Total S	C:N	C:S	N:S
			(2014)	(CaCl2)	(cmol/kg)									Saturation	(%)	(%)	(%)	Ratio	Ratio	Ratio
Moose Lake	**West**	**J2/LFH**	**553**	3.8											25.6	0.71	0.056	36	457	13
Moose Lake	**West**	**J2/0-2**	**554**	4.4	0.169	0.120	1.64	0.204	0.442	0.015	0.317	2.91	2.13	0.73	1.81	0.08	0.002	24	905	38
Moose Lake	**West**	**J2/2-5**	**555**	4.4	0.146	0.054	0.662	0.068	0.357	0.008	0.112	1.41	0.93	0.66	0.86	0.04	0.003	24	285	12
Moose Lake	**West**	**J2/5-10**	**556**	4.3	0.169	0.041	0.180	0.050	0.334	0.019	0.021	0.815	0.44	0.54	0.34	0.02	0.001	16	337	21
Moose Lake	**West**	**J2/10-15**	**557**	4.5	0.167	0.035	0.133	0.044	0.243	0.025	0.006	0.653	0.38	0.58	0.24	0.02	0.001	12	235	19
Moose Lake	**West**	**K2/LFH**	**561**	3.9											25.6	0.89	0.078	29	328	11
Moose Lake	**West**	**K2/0-2**	**562**	4.4	0.127	0.066	1.98	0.158	0.421	<0.001	0.221	2.98	2.34	0.78	1.84	0.09	0.006	20	307	15
Moose Lake	**West**	**K2/2-5**	**563**	4.4	0.127	0.038	1.02	0.066	0.324	<0.001	0.101	1.67	1.25	0.75	0.92	0.06	0.002	17	460	28
Moose Lake	**West**	**K2/5-10**	**564**	4.6	0.124	0.027	0.648	0.030	0.178	<0.001	0.028	1.03	0.83	0.80	0.40	0.03	0.002	12	200	17
Moose Lake	**West**	**K2/10-15**	**565**	4.7	0.122	0.020	0.440	0.013	0.087	<0.001	0.002	0.683	0.59	0.87	0.24	0.03	0.001	8	243	29
Moose Lake	**West**	**L2/LFH**	**569**	3.9											48.2	1.44	0.134	33	360	11
Moose Lake	**West**	**L2/0-2**	**570**	4.7	0.122	0.097	2.58	0.261	0.120	<0.001	0.154	3.21	3.06	0.95	1.76	0.09	0.005	20	352	18
Moose Lake	**West**	**L2/2-5**	**571**	5.0	0.120	0.056	1.40	0.161	0.029	<0.001	0.051	1.70	1.73	1.02	0.72	0.05	0.002	14	359	25
Moose Lake	**West**	**L2/5-10**	**572**	4.9	0.124	0.035	0.777	0.107	0.058	<0.001	0.026	1.13	1.04	0.92	0.35	0.03	0.002	10	175	17
Moose Lake	**West**	**L2/10-15**	**573**	4.8	0.129	0.027	0.551	0.085	0.046	<0.001	0.018	0.856	0.79	0.93	0.26	0.03	0.001	10	259	25

APPENDIX TABLE B3

SOLUBLE IONS

Appendix Table B2. Lab Report - Soluble Ions

Site	Plot	Field Id.	Lab ID (2014)	Sat'n (%)	pH (Ext.)	E.C. (dS/m)	Na	K	Ca	Mg	Al	Fe	Mn	S	Ca:Al Ratio	BC:Al Ratio
							(mg/L)									
Moose Lake	**East**	**A2/0-2**	**386**	52.8	4.5	0.38	2.46	24.8	47.1	10.7	19.4	15.7	23.7	8.27	1.6	3.3
Moose Lake	**East**	**A2/2-5**	**387**	44.8	4.8	0.27	2.41	13.1	30.3	6.60	5.48	2.87	8.03	4.26	3.7	7.2
Moose Lake	**East**	**A2/5-10**	**388**	37.6	5.1	0.12	1.72	4.32	9.22	1.89	3.80	2.40	0.89	1.35	1.6	3.5
Moose Lake	**East**	**A2/10-15**	**389**	37.8	5.3	0.09	1.37	3.02	6.30	1.34	2.05	1.18	0.26	1.00	2.1	4.6
Moose Lake	**East**	**B2/0-2**	**394**	56.0	4.8	0.23	1.38	11.4	26.6	5.03	5.75	3.98	7.32	5.61	3.1	5.7
Moose Lake	**East**	**B2/2-5**	**395**	52.8	5.1	0.16	0.99	5.93	19.7	3.04	2.63	0.91	2.65	3.23	5.0	8.3
Moose Lake	**East**	**B2/5-10**	**396**	43.2	4.9	0.13	0.91	5.95	12.6	2.50	4.14	2.38	3.40	2.53	2.0	4.0
Moose Lake	**East**	**B2/10-15**	**397**	38.8	5.1	0.13	1.94	5.33	12.0	2.19	2.34	1.25	1.42	2.40	3.5	7.1
Moose Lake	**East**	**C2/0-2**	**402**	81.5	5.0	0.22	0.89	9.25	34.4	6.20	2.45	1.56	2.94	6.20	9.5	15
Moose Lake	**East**	**C2/2-5**	**403**	50.0	5.5	0.18	1.39	6.14	23.1	4.76	2.54	1.44	2.78	3.57	6.1	11
Moose Lake	**East**	**C2/5-10**	**404**	38.4	5.5	0.16	2.12	3.64	13.9	3.29	1.30	0.45	3.20	3.83	7.2	14
Moose Lake	**East**	**C2/10-15**	**405**	36.4	5.2	0.11	2.21	1.72	7.55	2.16	0.73	0.27	0.86	3.28	6.9	15
Moose Lake	**East**	**D2/0-2**	**410**	55.2	5.6	0.17	0.68	9.57	22.0	4.24	4.91	2.60	0.73	3.41	3.0	5.5
Moose Lake	**East**	**D2/2-5**	**411**	46.0	5.8	0.16	1.29	6.21	21.3	4.02	6.37	3.85	1.32	3.08	2.2	3.9
Moose Lake	**East**	**D2/5-10**	**412**	43.6	5.5	0.14	1.65	3.86	16.1	3.26	7.55	3.77	1.07	2.58	1.4	2.5
Moose Lake	**East**	**D2/10-15**	**413**	38.0	5.2	0.15	2.29	3.13	14.6	3.03	6.85	3.56	1.76	2.36	1.4	2.6
Moose Lake	**East**	**E2/0-2**	**418**	55.2	4.7	0.30	2.19	18.2	35.7	7.54	8.25	5.56	12.7	7.38	2.9	5.8
Moose Lake	**East**	**E2/2-5**	**419**	48.4	5.7	0.19	2.23	6.10	20.4	3.68	4.16	2.69	2.67	3.87	3.3	5.9
Moose Lake	**East**	**E2/5-10**	**420**	39.6	5.0	0.16	2.44	4.63	14.9	2.95	4.87	3.18	2.17	1.98	2.1	4.0
Moose Lake	**East**	**E2/10-15**	**421**	37.2	5.1	0.12	2.04	3.35	11.0	2.22	4.09	2.40	0.74	1.21	1.8	3.6
Moose Lake	**East**	**F2/0-2**	**426**	59.6	5.5	0.25	0.77	14.8	29.5	6.37	2.36	1.05	2.52	5.50	8.4	16
Moose Lake	**East**	**F2/2-5**	**427**	50.4	5.6	0.22	1.20	15.5	20.3	4.91	4.41	2.64	2.72	4.15	3.1	7.1
Moose Lake	**East**	**F2/5-10**	**428**	46.4	4.7	0.24	1.89	20.7	16.9	4.30	5.97	3.20	4.70	3.76	1.9	5.5
Moose Lake	**East**	**F2/10-15**	**429**	38.4	5.1	0.15	1.88	9.60	7.53	2.15	3.61	1.70	1.90	1.97	1.4	4.5
Moose Lake	**East**	**G2/0-2**	**434**	54.4	4.9	0.26	1.44	14.2	25.5	5.87	5.82	4.09	6.95	5.28	3.0	6.0
Moose Lake	**East**	**G2/2-5**	**435**	50.0	5.5	0.19	1.44	6.08	16.1	3.18	2.74	1.53	2.80	3.28	4.0	7.4
Moose Lake	**East**	**G2/5-10**	**436**	41.2	5.2	0.11	1.26	5.28	8.14	2.03	4.66	2.79	2.70	1.21	1.2	2.8
Moose Lake	**East**	**G2/10-15**	**437**	38.8	5.0	0.09	1.57	2.24	4.59	1.27	1.55	0.82	0.49	0.76	2.0	5.1
Moose Lake	**East**	**H2/0-2**	**442**	57.2	5.5	0.19	0.76	9.20	23.2	5.20	2.05	0.40	0.005	3.35	7.6	14
Moose Lake	**East**	**H2/2-5**	**443**	56.0	5.7	0.18	1.19	13.5	15.8	4.19	2.89	0.97	0.65	2.58	3.7	9.0
Moose Lake	**East**	**H2/10-15**	**445**	40.4	5.3	0.16	2.56	10.6	9.65	2.94	2.62	1.32	1.63	3.47	2.5	7.7
Moose Lake	**East**	**H2/5-10**	**444**	51.2	5.6	0.22	1.98	15.3	19.8	5.24	2.08	1.09	2.14	4.10	6.4	15
Moose Lake	**East**	**H2/10-15**	**445**	40.4	5.3	0.16	2.56	10.6	9.65	2.94	2.62	1.32	1.63	3.47	2.5	7.7

Site	Plot	Field Id.	Lab ID	Sat'n	pH	E.C.	Na	K	Ca	Mg	Al	Fe	Mn	S	Ca:Al	BC:Al
			(2014)	(%)	(Ext.)	(dS/m)	(mg/L)								Ratio	Ratio
Moose Lake	**East**	**I2/0-2**	**450**	56.8	4.6	0.37	2.29	27.2	44.7	9.50	11.1	9.79	8.99	6.88	2.7	5.6
Moose Lake	**East**	**I2/2-5**	**451**	43.2	5.3	0.19	2.38	13.2	14.5	4.35	6.33	3.76	2.16	4.09	1.5	4.2
Moose Lake	**East**	**I2/5-10**	**452**	42.0	5.0	0.14	2.70	9.64	6.94	2.60	2.44	1.29	0.20	4.27	1.9	7.1
Moose Lake	**East**	**I2/10-15**	**453**	37.6	4.9	0.12	3.30	4.95	4.94	2.11	1.19	0.51	0.11	3.68	2.8	11
Moose Lake	**East**	**J2/0-2**	**458**	64.8	5.6	0.21	0.78	7.63	22.6	4.87	0.96	0.48	0.98	4.33	16	28
Moose Lake	**East**	**J2/2-5**	**459**	51.6	5.7	0.15	0.66	8.02	13.6	3.24	2.55	1.45	0.97	2.29	3.6	7.5
Moose Lake	**East**	**J2/5-10**	**460**	38.4	5.7	0.13	0.99	8.23	11.5	3.08	4.27	2.66	1.13	1.91	1.8	4.2
Moose Lake	**East**	**J2/10-15**	**461**	37.6	4.9	0.09	1.80	3.65	7.76	2.50	5.16	2.82	0.16	1.64	1.0	2.4
Moose Lake	**East**	**K2/0-2**	**466**	56.8	5.0	0.28	1.41	19.9	34.6	6.02	6.17	4.91	8.84	5.54	3.8	7.3
Moose Lake	**East**	**K2/2-5**	**467**	42.4	5.2	0.12	1.26	5.70	10.9	2.44	5.48	3.27	2.35	1.71	1.3	2.8
Moose Lake	**East**	**K2/5-10**	**468**	39.2	5.1	0.09	1.15	3.98	6.08	1.66	2.61	1.59	0.56	1.11	1.6	3.9
Moose Lake	**East**	**K2/10-15**	**469**	36.8	5.0	0.07	1.00	2.35	3.71	1.20	1.91	1.25	0.16	0.87	1.3	3.5
Moose Lake	**East**	**L2/0-2**	**474**	83.8	4.6	0.36	2.62	20.5	55.2	8.79	7.30	4.88	9.93	9.20	5.1	8.8
Moose Lake	**East**	**L2/2-5**	**475**	44.8	5.6	0.15	1.82	3.50	22.2	3.31	3.08	2.11	1.49	3.02	4.9	7.5
Moose Lake	**East**	**L2/5-10**	**476**	39.6	5.2	0.11	2.05	2.29	12.0	2.51	3.26	1.73	0.60	2.64	2.5	4.6
Moose Lake	**East**	**L2/10-15**	**477**	37.6	5.0	0.09	2.83	1.88	6.09	1.95	1.98	0.97	0.19	1.90	2.1	5.5
Moose Lake	**West**	**A2/0-2**	**482**	59.6	4.4	0.19	2.01	6.35	21.9	3.05	5.52	3.08	7.40	4.00	2.7	4.5
Moose Lake	**West**	**A2/2-5**	**483**	46.0	5.1	0.13	1.20	2.90	12.5	1.65	5.35	3.03	1.87	1.87	1.6	2.6
Moose Lake	**West**	**A2/5-10**	**484**	39.6	4.7	0.08	1.03	1.91	8.72	1.28	2.92	1.78	0.94	0.96	2.0	3.4
Moose Lake	**West**	**A2/10-15**	**485**	37.2	4.7	0.07	0.88	1.91	6.43	1.10	2.00	1.16	0.41	0.63	2.2	4.0
Moose Lake	**West**	**B2/0-2**	**490**	51.6	5.3	0.11	0.71	6.53	10.4	1.66	1.27	0.97	2.01	1.77	5.5	11
Moose Lake	**West**	**B2/2-5**	**491**	42.0	5.0	0.09	0.88	5.93	7.64	1.40	3.54	2.87	1.53	1.04	1.5	3.3
Moose Lake	**West**	**B2/5-10**	**492**	37.6	4.6	0.07	0.70	2.38	6.48	1.13	2.12	1.33	0.46	0.56	2.1	3.8
Moose Lake	**West**	**B2/10-15**	**493**	36.4	4.9	0.05	0.56	1.99	5.95	1.01	1.88	1.16	0.02	0.53	2.1	3.8
Moose Lake	**West**	**C2/0-2**	**498**	49.2	5.5	0.09	0.42	3.18	7.67	1.77	1.00	0.34	0.02	1.44	5.1	9.8
Moose Lake	**West**	**C2/2-5**	**499**	45.6	5.1	0.07	0.51	3.99	6.49	1.66	3.80	1.93	0.05	0.97	1.1	2.5
Moose Lake	**West**	**C2/5-10**	**500**	39.6	5.0	0.08	0.82	4.75	6.18	1.57	5.46	2.93	0.15	0.95	0.8	1.9
Moose Lake	**West**	**C2/10-15**	**501**	37.6	4.8	0.07	0.75	3.75	6.41	1.32	3.77	1.99	0.13	0.99	1.1	2.5
Moose Lake	**West**	**D2/0-2**	**506**	63.6	4.8	0.29	4.31	19.9	29.6	4.92	22.2	17.0	19.7	9.12	0.9	2.0
Moose Lake	**West**	**E2/2-5**	**515**	43.2	5.0	0.12	1.46	6.93	9.22	1.96	2.61	1.75	3.35	1.60	2.4	5.7
Moose Lake	**West**	**E2/5-10**	**516**	38.4	5.3	0.10	0.92	4.31	8.31	1.60	1.67	0.99	0.05	0.98	3.3	6.8
Moose Lake	**West**	**E2/10-15**	**517**	36.8	5.4	0.11	0.82	3.93	8.58	1.82	3.00	1.83	0.51	0.95	1.9	3.8

Site	Plot	Field Id.	Lab ID	Sat'n	pH	E.C.	Na	K	Ca	Mg	Al	Fe	Mn	S	Ca:Al	BC:Al
			(2014)	(%)	(Ext.)	(dS/m)	(mg/L)								Ratio	Ratio
Moose Lake	**West**	**D2/2-5**	**507**	50.0	5.2	0.11	1.11	3.37	12.7	1.36	4.77	2.38	1.79	1.73	1.8	2.9
Moose Lake	**West**	**F2/0-2**	**522**	47.2	5.0	0.10	0.59	9.47	5.83	1.32	1.64	0.98	1.84	1.33	2.4	7.7
Moose Lake	**West**	**D2/5-10**	**508**	41.2	5.3	0.10	0.80	2.72	11.4	1.21	4.61	2.66	0.99	1.11	1.7	2.6
Moose Lake	**West**	**D2/10-15**	**509**	38.0	5.4	0.09	0.83	2.26	9.09	1.29	4.13	2.55	0.84	0.78	1.5	2.4
Moose Lake	**West**	**E2/0-2**	**514**	48.0	4.8	0.14	0.96	8.28	11.2	2.43	2.64	1.90	4.13	2.34	2.8	6.5
Moose Lake	**West**	**F2/2-5**	**523**	42.8	5.1	0.09	0.61	6.05	4.56	0.88	1.66	1.02	0.95	0.75	1.9	5.4
Moose Lake	**West**	**F2/5-10**	**524**	37.6	5.0	0.10	0.90	5.59	4.62	0.97	3.08	1.68	0.66	0.71	1.0	3.0
Moose Lake	**West**	**F2/10-15**	**525**	37.2	5.0	0.09	0.88	3.68	3.39	0.78	2.16	1.08	0.35	0.47	1.1	3.1
Moose Lake	**West**	**G2/0-2**	**530**	68.8	5.0	0.18	0.69	10.9	23.8	4.78	2.48	1.51	1.98	3.98	6.5	12
Moose Lake	**West**	**G2/2-5**	**531**	50.4	5.2	0.16	1.15	8.36	19.7	3.69	3.50	1.86	1.98	2.56	3.8	7.0
Moose Lake	**West**	**G2/5-10**	**532**	41.6	5.5	0.12	1.15	5.86	14.3	2.88	4.89	3.49	1.12	1.52	2.0	3.7
Moose Lake	**West**	**G2/10-15**	**533**	37.6	5.6	0.12	1.30	4.27	11.1	2.60	2.84	1.69	0.89	1.41	2.6	5.2
Moose Lake	**West**	**H2/0-2**	**538**	51.6	5.2	0.21	1.37	21.7	21.0	3.98	4.54	3.08	5.73	4.41	3.1	7.7
Moose Lake	**West**	**H2/2-5**	**539**	41.6	5.3	0.15	1.72	13.4	13.2	2.97	5.20	3.09	3.18	2.12	1.7	4.5
Moose Lake	**West**	**H2/5-10**	**540**	38.0	5.3	0.11	1.39	6.60	8.57	2.07	3.45	2.22	0.97	1.08	1.7	4.1
Moose Lake	**West**	**H2/10-15**	**541**	37.2	5.4	0.09	1.14	5.11	6.39	1.60	2.06	1.04	0.17	0.78	2.1	5.3
Moose Lake	**West**	**I2/0-2**	**546**	58.4	5.0	0.21	1.61	11.0	29.0	4.59	5.99	3.87	4.57	5.34	3.3	5.7
Moose Lake	**West**	**I2/2-5**	**547**	45.2	5.4	0.18	1.75	8.29	22.8	3.35	3.98	2.35	2.74	3.27	3.9	6.8
Moose Lake	**West**	**I2/5-10**	**548**	37.6	5.7	0.13	1.32	4.60	15.6	2.29	6.50	4.01	1.17	1.73	1.6	2.7
Moose Lake	**West**	**I2/10-15**	**549**	36.8	5.9	0.09	0.71	2.39	9.41	1.94	8.52	4.38	0.07	0.83	0.7	1.3
Moose Lake	**West**	**J2/0-2**	**554**	56.8	5.1	0.16	0.89	11.7	14.4	2.98	4.22	2.40	4.69	3.33	2.3	5.3
Moose Lake	**West**	**J2/2-5**	**555**	48.6	5.1	0.11	1.16	5.91	8.76	1.64	2.02	0.91	2.69	1.36	2.9	6.5
Moose Lake	**West**	**J2/5-10**	**556**	38.0	5.0	0.09	1.78	3.32	3.64	0.96	1.18	0.50	0.77	0.64	2.1	6.7
Moose Lake	**West**	**J2/10-15**	**557**	36.8	5.1	0.09	1.07	2.12	2.52	0.69	0.47	0.12	0.15	0.44	3.6	11
Moose Lake	**West**	**K2/0-2**	**562**	50.8	5.1	0.15	0.60	8.29	14.5	2.79	1.33	0.68	2.31	2.96	7.3	14
Moose Lake	**West**	**K2/2-5**	**563**	42.8	5.1	0.13	1.10	6.60	11.5	2.06	1.91	0.85	2.14	1.61	4.0	8.3
Moose Lake	**West**	**K2/5-10**	**564**	39.6	5.2	0.13	1.23	4.17	10.1	1.67	3.63	1.94	0.89	1.11	1.9	3.6
Moose Lake	**West**	**K2/10-15**	**565**	37.2	5.5	0.09	1.07	2.95	7.36	1.12	1.45	0.61	0.18	0.74	3.4	6.5
Moose Lake	**West**	**L2/0-2**	**570**	52.0	5.6	0.14	0.80	9.44	16.1	3.43	1.30	0.44	0.01	2.89	8.3	17
Moose Lake	**West**	**L2/2-5**	**571**	42.8	6.1	0.12	1.00	7.52	12.7	3.08	2.90	1.65	0.95	1.80	3.0	6.3
Moose Lake	**West**	**L2/5-10**	**572**	38.4	5.6	0.13	1.15	5.94	10.9	2.78	3.78	1.85	0.70	1.53	1.9	4.2
Moose Lake	**West**	**L2/10-15**	**573**	36.8	5.6	0.10	1.04	4.07	8.39	2.35	5.45	2.88	0.38	1.25	1.0	2.3