

**APPENDIX E:
TRENDS TABLES**

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The tables in Appendix E give the mean and standard error of the mean in parentheses for each site and season. The parameters examined are the concentrations of sulfate, organic carbon, PM_{2.5}, nitrate, and a trace metal total (the sum of the concentrations of the elements Ti, V, Cr, Mn, Fe, Co, Ni, Cu, and Zn), and several ratios. The ratios are sulfur/sulfate, nitrate/sulfate, Se/sulfate, reconstructed mass/PM_{2.5}, and Fe/trace metal, Ni/trace metal, Se/trace metal, and K/trace metal. The concentrations are shown in ng/m³ and the ratios are ratios of ng/m³ to ng/m³ except for the Se/sulfate ratio, which is multiplied by 1,000.

Table E-1. Sulfur/Sulfate Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.36(0.004)	0.365(0.004)		0.338(0.004)	0.364(0.004)	+	0.341(0.004)	0.356(0.004)	+	0.341(0.004)	0.351(0.004)	
Arendtsville	0.263(0.384)	0.23(0.312)		0.213(0.432)	0.29(0.362)		1.52(0.409)	0.239(0.332)	-	0.201(0.441)	0.262(0.349)	
Boundary Waters Canoe Area	0.35(0.004)	0.345(0.005)		0.326(0.004)	0.343(0.005)	+	0.346(0.004)	0.355(0.005)		0.328(0.004)	0.326(0.004)	
Brigantine Natl. Wildlife Refuge	0.345(0.004)	0.36(0.004)	+	0.326(0.004)	0.359(0.005)	+	0.316(0.004)	0.344(0.005)	+	0.328(0.004)	0.353(0.004)	+
Bondville	0.26(0.018)	0.268(0.014)		0.212(0.019)	0.281(0.015)	+	0.268(0.016)	0.279(0.015)		0.261(0.017)	0.26(0.015)	
Connecticut Hill	0.253(0.011)	0.263(0.008)		0.243(0.013)	0.298(0.009)	+	0.253(0.01)	0.282(0.009)	+	0.237(0.011)	0.271(0.009)	+
Dolly Sods Wilderness Area	0.333(0.004)	0.344(0.004)	+	0.331(0.004)	0.351(0.004)	+	0.314(0.004)	0.357(0.005)	+	0.325(0.004)	0.345(0.004)	+
Great Smoky Mountains Natl. Park	0.331(0.051)	0.359(0.052)		0.345(0.047)	0.188(0.055)	-	0.308(0.049)	0.347(0.055)		0.336(0.05)	0.341(0.048)	
Jefferson/James River Face Wildlife Area	0.337(0.004)	0.349(0.004)	+	0.341(0.004)	0.348(0.004)		0.329(0.004)	0.351(0.004)	+	0.33(0.005)	0.348(0.004)	+
Livonia	0.259(0.101)	0.252(0.072)		0.242(0.099)	0.279(0.076)		0.216(0.085)	0.455(0.078)	+	0.235(0.09)	0.264(0.076)	
Lye Brook Wilderness Area	0.334(0.005)	0.37(0.005)	+	0.341(0.005)	0.362(0.005)	+	0.333(0.005)	0.378(0.005)	+	0.334(0.005)	0.35(0.005)	+
Mammoth Cave Natl. Park	0.344(0.005)	0.357(0.004)	+	0.332(0.004)	0.358(0.005)	+	0.303(0.004)	0.352(0.005)	+	0.339(0.004)	0.361(0.004)	+
M.K. Goddard	0.259(0.011)	0.256(0.009)		0.249(0.013)	0.289(0.01)	+	0.216(0.012)	0.248(0.01)	+	0.285(0.012)	0.253(0.01)	-
Quaker City	0.247(0.027)	0.272(0.02)		0.26(0.031)	0.307(0.023)		0.244(0.026)	0.269(0.024)		0.266(0.033)	0.314(0.022)	
Shenandoah National Park	0.335(0.004)	0.347(0.004)	+	0.331(0.003)	0.341(0.004)		0.322(0.004)	0.359(0.005)	+	0.334(0.004)	0.357(0.004)	+
Washington, D.C.	0.362(0.005)	0.347(0.005)	-	0.339(0.004)	0.358(0.005)	+	0.348(0.004)	0.362(0.005)	+	0.336(0.005)	0.339(0.005)	

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-2. Reconstructed Mass/PM_{2.5} Mass Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.69(0.014)	0.645(0.014)	-	0.695(0.013)	0.611(0.015)	-	0.64(0.013)	0.567(0.015)	-	0.748(0.014)	0.654(0.013)	-
Arendtsville	0.832(0.184)	0.756(0.149)		0.7(0.207)	0.591(0.174)		1.313(0.196)	1.035(0.159)		0.898(0.211)	0.538(0.165)	
Boundary Waters Canoe Area	0.632(0.015)	0.612(0.017)		0.657(0.013)	0.613(0.018)	-	0.576(0.015)	0.609(0.018)		0.643(0.015)	0.623(0.015)	
Brigantine Natl. Wildlife Refuge	0.722(0.015)	0.665(0.014)	-	0.676(0.013)	0.595(0.015)	-	0.67(0.014)	0.56(0.016)	-	0.693(0.015)	0.59(0.014)	-
Bondville	0.763(0.031)	0.54(0.023)	-	0.605(0.033)	0.48(0.025)	-	0.76(0.028)	0.611(0.026)	-	0.534(0.029)	0.434(0.026)	-
Connecticut Hill	0.934(0.139)	0.623(0.103)		0.748(0.163)	0.594(0.118)		1.204(0.131)	0.638(0.118)	-	0.867(0.139)	0.624(0.114)	
Dolly Sods Wilderness Area	0.679(0.016)	0.717(0.015)		0.689(0.014)	0.629(0.017)	-	0.653(0.016)	0.641(0.017)		0.717(0.017)	0.699(0.015)	
Great Smoky Mountains Natl. Park	0.706(0.016)	0.715(0.015)		0.669(0.014)	0.643(0.016)		0.651(0.015)	0.675(0.016)		0.706(0.015)	0.728(0.015)	
Jefferson/James River Face Wildlife Area	0.693(0.018)	0.66(0.014)		0.672(0.019)	0.591(0.016)	-	0.645(0.019)	0.588(0.015)	-	0.692(0.021)	0.642(0.013)	-
Livonia	0.763(0.043)	0.623(0.031)	-	0.772(0.042)	0.572(0.032)	-	0.796(0.036)	0.679(0.033)	-	0.687(0.038)	0.549(0.032)	-
Lye Brook Wilderness Area	0.596(0.016)	0.577(0.015)		0.635(0.014)	0.512(0.016)	-	0.604(0.014)	0.54(0.016)	-	0.656(0.017)	0.585(0.015)	-
Mammoth Cave Natl. Park	0.687(0.017)	0.601(0.015)	-	0.67(0.015)	0.477(0.016)	-	0.708(0.016)	0.538(0.017)	-	0.689(0.015)	0.596(0.015)	-
M.K. Goddard	0.81(0.127)	0.593(0.103)		0.772(0.143)	0.598(0.109)		1.186(0.134)	0.731(0.113)	-	0.776(0.136)	0.552(0.114)	
Quaker City	0.862(0.043)	0.649(0.032)	-	0.705(0.049)	0.634(0.036)		0.742(0.041)	0.708(0.039)		0.672(0.052)	0.66(0.035)	
Shenandoah National Park	0.669(0.017)	0.718(0.016)	+	0.672(0.015)	0.627(0.018)		0.653(0.016)	0.639(0.019)		0.676(0.018)	0.68(0.016)	
Washington, D.C.	0.684(0.015)	0.597(0.014)	-	0.683(0.013)	0.552(0.015)	-	0.649(0.013)	0.559(0.015)	-	0.631(0.016)	0.564(0.014)	-

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-3. PM_{2.5} Mass Concentrations Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	5115(458.5)	5372(442.2)		5336(412.1)	5080(473.5)		9935(416.3)	9606(493.6)		5646(467.3)	5228(429.9)	
Arendtsville	8794(1444)	12333(1173)		11756(1627)	10483(1364)		16403(1540)	15560(1250)		11517(1659)	9936(1295)	
Boundary Waters Canoe Area	3923(433.9)	4662(484.2)		4668(383.2)	4682(511.9)		6707(416.6)	6479(527.7)		5129(443.3)	5000(440.1)	
Brigantine Natl. Wildlife Refuge	9972(702)	9937(643)		10385(609)	9372(697.2)		14561(654.4)	15444(738.2)		10234(666.4)	10064(635.7)	
Bondville	9372(1238)	12238(924.3)		10801(1307)	10923(993.6)		16411(1111)	14895(1041)		11364(1143)	9631(1028)	
Connecticut Hill	6500(1260)	10311(930.8)	+	7112(1472)	6301(1065)		12492(1184)	15770(1065)	+	6762(1260)	7356(1029)	
Dolly Sods Wilderness Area	9860(665.8)	10436(642.5)		9843(599.3)	10459(692)		18981(657.8)	18129(721.4)		7567(711.2)	8375(631.7)	
Great Smoky Mountains Natl. Park	10666(701.9)	11950(673.1)		11035(647.5)	12120(729.8)		20401(677)	21369(734.8)		6881(689.1)	7446(654.5)	
Jefferson/James River Face Wildlife Area	14154(870)	14123(680.1)		12984(931.2)	12213(760.3)		20673(912.4)	19680(740.1)		12867(1020)	12408(655.1)	
Livonia	10414(1320)	12142(942.6)		9465(1294)	10728(994.7)		17734(1115)	18023(1018)		11280(1166)	9273(994.7)	
Lye Brook Wilderness Area	5469(585.6)	6264(558)		5812(530.8)	6924(594.3)		10617(533.9)	10408(603.4)		5147(628)	5575(565.5)	
Mammoth Cave Natl. Park	11564(751.1)	12686(655.4)		12001(637.5)	13346(714.7)		19698(705.2)	19645(740.1)		10171(663)	9582(644.5)	
M.K. Goddard	8790(1286)	13458(1045)	+	8661(1449)	9364(1089)		16792(1349)	16604(1140)		9753(1372)	9840(1154)	
Quaker City	9556(1417)	12124(1064)		9751(1611)	9130(1203)		21523(1353)	17562(1280)	-	11107(1722)	8830(1163)	
Shenandoah National Park	10438(679.9)	10063(636)		9407(593.7)	10138(713.1)		19360(647.1)	16528(734.4)	-	6215(693.6)	6327(651)	
Washington, D.C.	15600(836.3)	14725(821.3)		15208(760.3)	13525(863.4)		22979(764.2)	20070(875)	-	16384(906.1)	14411(789)	

* The table values are in the form of mean (standard deviation) in ng/m³. A flag indicates the direction of a statistically significant change.

Table E-4. Iron/Trace Metals Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.46(0.017)	0.458(0.016)		0.6(0.015)	0.57(0.017)		0.565(0.015)	0.545(0.018)		0.517(0.017)	0.47(0.015)	-
Arendtsville	0.523(0.019)	0.616(0.015)	+	0.546(0.021)	0.645(0.018)	+	0.557(0.02)	0.638(0.016)	+	0.466(0.022)	0.575(0.017)	+
Boundary Waters Canoe Area	0.731(0.021)	0.611(0.024)	-	0.758(0.019)	0.762(0.025)		0.749(0.021)	0.735(0.026)		0.669(0.022)	0.697(0.022)	
Brigantine Natl. Wildlife Refuge	0.582(0.012)	0.57(0.01)		0.61(0.01)	0.609(0.012)		0.625(0.011)	0.607(0.012)		0.527(0.011)	0.566(0.011)	+
Bondville	0.519(0.02)	0.627(0.015)	+	0.592(0.021)	0.651(0.016)	+	0.6(0.018)	0.674(0.017)	+	0.495(0.018)	0.567(0.016)	+
Connecticut Hill	0.508(0.02)	0.608(0.015)	+	0.529(0.023)	0.636(0.017)	+	0.55(0.019)	0.65(0.017)	+	0.47(0.02)	0.566(0.016)	+
Dolly Sods Wilderness Area	0.581(0.014)	0.552(0.013)		0.639(0.013)	0.667(0.014)		0.596(0.014)	0.609(0.015)		0.55(0.015)	0.57(0.013)	
Great Smoky Mountains Natl. Park	0.569(0.013)	0.568(0.013)		0.631(0.012)	0.658(0.014)		0.623(0.013)	0.645(0.014)		0.549(0.013)	0.541(0.012)	
Jefferson/James River Face Wildlife Area	0.699(0.014)	0.682(0.011)		0.74(0.015)	0.732(0.012)		0.731(0.015)	0.679(0.012)	-	0.688(0.017)	0.668(0.011)	
Livonia	0.503(0.021)	0.632(0.015)	+	0.573(0.021)	0.661(0.016)	+	0.568(0.018)	0.659(0.016)	+	0.509(0.019)	0.586(0.016)	+
Lye Brook Wilderness Area	0.546(0.018)	0.474(0.017)	-	0.608(0.017)	0.654(0.018)		0.587(0.017)	0.58(0.019)		0.521(0.019)	0.493(0.017)	
Mammoth Cave Natl. Park	0.578(0.013)	0.609(0.011)		0.643(0.011)	0.649(0.012)		0.635(0.012)	0.617(0.012)		0.595(0.011)	0.584(0.011)	
M.K. Goddard	0.528(0.015)	0.635(0.012)	+	0.567(0.017)	0.652(0.013)	+	0.527(0.016)	0.65(0.013)	+	0.528(0.016)	0.616(0.013)	+
Quaker City	0.507(0.018)	0.54(0.014)		0.55(0.021)	0.583(0.015)		0.534(0.017)	0.58(0.016)		0.479(0.022)	0.528(0.015)	
Shenandoah National Park	0.574(0.014)	0.572(0.013)		0.654(0.012)	0.644(0.014)		0.621(0.013)	0.636(0.015)		0.574(0.014)	0.521(0.013)	-
Washington, D.C.	0.738(0.009)	0.768(0.009)	+	0.729(0.008)	0.749(0.009)		0.731(0.008)	0.745(0.009)		0.678(0.01)	0.747(0.009)	+

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-5. Nickel/Trace Metals Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.036(0.002)	0.03(0.002)		0.023(0.002)	0.022(0.002)		0.03(0.002)	0.03(0.003)		0.04(0.002)	0.036(0.002)	
Arendtsville	0.011(0.003)	0.015(0.002)		0.016(0.003)	0.015(0.003)		0.012(0.003)	0.016(0.003)		0.026(0.004)	0.018(0.003)	
Boundary Waters Canoe Area	0.003(85E-5)	0.002(96E-5)		0.003(74E-5)	0.002(0.001)		52E-5(83E-5)	91E-5(0.001)		0.003(89E-5)	0.002(87E-5)	
Brigantine Natl. Wildlife Refuge	0.027(0.003)	0.021(0.002)		0.028(0.002)	0.026(0.003)		0.022(0.002)	0.022(0.003)		0.051(0.003)	0.034(0.002)	-
Bondville	0.008(0.001)	0.008(97E-5)		0.006(0.001)	0.01(0.001)	+	0.005(0.001)	0.008(0.001)		0.005(0.001)	0.014(0.001)	+
Connecticut Hill	0.011(0.003)	0.015(0.002)		0.015(0.003)	0.017(0.002)		0.013(0.002)	0.013(0.002)		0.015(0.003)	0.026(0.002)	+
Dolly Sods Wilderness Area	0.006(87E-5)	0.002(82E-5)	-	0.004(79E-5)	0.002(9E-4)		0.002(85E-5)	0.002(92E-5)		0.005(93E-5)	0.004(81E-5)	
Great Smoky Mountains Natl. Park	0.005(0.001)	0.004(0.001)		0.002(0.001)	0.002(0.001)		0.001(0.001)	45E-5(0.001)		0.004(0.001)	0.002(0.001)	
Jefferson/James River Face Wildlife Area	0.008(0.001)	0.002(91E-5)	-	0.002(0.001)	0.003(0.001)		0.003(0.001)	0.001(0.001)		0.007(0.001)	0.004(88E-5)	
Livonia	0.009(0.001)	0.009(0.001)		0.011(0.001)	0.01(0.001)		0.007(0.001)	0.009(0.001)		0.006(0.001)	0.012(0.001)	+
Lye Brook Wilderness Area	0.02(0.002)	0.016(0.002)		0.016(0.002)	0.014(0.002)		0.015(0.002)	0.012(0.002)		0.031(0.002)	0.018(0.002)	-
Mammoth Cave Natl. Park	0.003(48E-5)	87E-5(41E-5)	-	0.002(4E-4)	0.002(45E-5)		0.001(44E-5)	0.001(46E-5)		0.003(42E-5)	0.002(4E-4)	-
M.K. Goddard	0.011(0.002)	0.009(0.001)		0.006(0.002)	0.011(0.001)		0.01(0.002)	0.01(0.002)		0.009(0.002)	0.011(0.002)	
Quaker City	0.01(0.002)	0.011(0.001)		0.007(0.002)	0.013(0.001)	+	0.009(0.001)	0.014(0.001)	+	0.006(0.002)	0.014(0.001)	+
Shenandoah National Park	0.006(0.001)	0.004(0.001)		0.006(0.001)	0.003(0.001)		0.004(0.001)	0.003(0.001)		0.011(0.001)	0.004(0.001)	-
Washington, D.C.	0.01(0.001)	0.003(0.001)	-	0.011(0.001)	0.007(0.001)	-	0.007(0.001)	0.005(0.001)		0.025(0.002)	0.006(0.001)	-

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-6. Potassium/Trace Metals Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	1.377(0.083)	1.253(0.079)		1.215(0.074)	1.145(0.084)		1.141(0.074)	1.121(0.088)		1.567(0.084)	1.301(0.076)	-
Arendtsville	0.962(0.063)	0.784(0.051)	-	0.74(0.071)	0.757(0.059)		0.788(0.067)	0.681(0.054)		1.058(0.072)	0.981(0.056)	
Boundary Waters Canoe Area	1.292(0.099)	1.369(0.112)		0.899(0.087)	0.991(0.119)		1.302(0.097)	1.029(0.123)		1.185(0.103)	0.986(0.101)	
Brigantine Natl. Wildlife Refuge	0.81(0.06)	0.851(0.054)		0.784(0.052)	0.898(0.06)		0.75(0.056)	0.772(0.063)		0.899(0.057)	0.887(0.055)	
Bondville	1.013(0.08)	1.039(0.059)		0.66(0.084)	0.709(0.064)		0.728(0.072)	0.655(0.067)		0.89(0.074)	0.833(0.066)	
Connecticut Hill	0.946(0.059)	0.798(0.044)	-	0.754(0.069)	0.765(0.05)		0.834(0.056)	0.76(0.05)		0.9(0.059)	0.896(0.048)	
Dolly Sods Wilderness Area	1.035(0.055)	1.019(0.052)		0.86(0.05)	0.935(0.056)		0.92(0.054)	0.828(0.058)		1.223(0.058)	1.302(0.051)	
Great Smoky Mountains Natl. Park	1.258(0.073)	1.379(0.07)		1.075(0.068)	1.25(0.075)		0.928(0.071)	0.946(0.077)		1.572(0.072)	1.539(0.068)	
Jefferson/James River Face Wildlife Area	1.119(0.088)	1.517(0.068)	+	0.909(0.093)	1.047(0.077)		1.196(0.093)	1.053(0.075)		1.233(0.103)	1.734(0.066)	+
Livonia	1.304(0.109)	1.181(0.078)		0.978(0.107)	0.887(0.082)		1.102(0.092)	0.887(0.084)		1.269(0.097)	1.017(0.082)	-
Lye Brook Wilderness Area	1.08(0.067)	0.95(0.062)		0.859(0.061)	0.909(0.068)		1.061(0.061)	0.884(0.069)		1.111(0.071)	1.006(0.063)	
Mammoth Cave Natl. Park	1.15(0.066)	1.102(0.057)		0.924(0.055)	1.001(0.062)		0.931(0.061)	0.961(0.064)		1.073(0.058)	1.12(0.055)	
M.K. Goddard	0.807(0.113)	0.662(0.092)		0.757(0.127)	0.732(0.096)		0.96(0.119)	0.967(0.1)		0.857(0.121)	0.634(0.101)	
Quaker City	0.823(0.067)	0.926(0.051)		0.736(0.076)	0.762(0.057)		0.777(0.064)	0.677(0.06)		0.926(0.081)	0.972(0.055)	
Shenandoah National Park	0.849(0.067)	0.969(0.062)		0.806(0.058)	0.89(0.068)		0.992(0.063)	0.912(0.071)		1.048(0.068)	1.03(0.062)	
Washington, D.C.	0.417(0.04)	0.435(0.038)		0.389(0.036)	0.407(0.041)		0.557(0.036)	0.454(0.041)		0.509(0.043)	0.48(0.037)	

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-7. Selenium/Trace Metals Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.016(0.001)	0.013(0.001)		0.012(0.001)	0.012(0.001)		0.015(0.001)	0.013(0.001)		0.017(0.001)	0.013(0.001)	-
Arendtsville	0.035(0.003)	0.038(0.002)		0.034(0.003)	0.028(0.003)		0.032(0.003)	0.038(0.003)		0.036(0.003)	0.045(0.003)	+
Boundary Waters Canoe Area	0.008(0.001)	0.008(0.001)		0.007(88E-5)	0.007(0.001)		0.007(0.001)	0.007(0.001)		0.009(0.001)	0.006(0.001)	-
Brigantine Natl. Wildlife Refuge	0.02(0.001)	0.021(0.001)		0.016(0.001)	0.021(0.001)	+	0.018(0.001)	0.021(0.001)		0.025(0.001)	0.028(0.001)	
Bondville	0.029(0.003)	0.029(0.002)		0.028(0.003)	0.028(0.002)		0.037(0.003)	0.034(0.003)		0.026(0.003)	0.035(0.003)	+
Connecticut Hill	0.031(0.004)	0.046(0.003)	+	0.027(0.004)	0.029(0.003)		0.034(0.003)	0.039(0.003)		0.041(0.004)	0.049(0.003)	
Dolly Sods Wilderness Area	0.037(0.003)	0.047(0.003)	+	0.031(0.003)	0.036(0.003)		0.031(0.003)	0.035(0.003)		0.054(0.003)	0.054(0.003)	
Great Smoky Mountains Natl. Park	0.03(0.002)	0.029(0.002)		0.019(0.002)	0.023(0.002)		0.024(0.002)	0.022(0.002)		0.037(0.002)	0.033(0.002)	
Jefferson/James River Face Wildlife Area	0.022(0.002)	0.026(0.001)		0.015(0.002)	0.02(0.002)	+	0.02(0.002)	0.019(0.002)		0.025(0.002)	0.028(0.001)	
Livonia	0.045(0.005)	0.041(0.003)		0.036(0.005)	0.031(0.004)		0.04(0.004)	0.045(0.004)		0.048(0.004)	0.05(0.004)	
Lye Brook Wilderness Area	0.017(0.002)	0.018(0.001)		0.01(0.001)	0.014(0.002)		0.014(0.001)	0.016(0.002)		0.021(0.002)	0.019(0.001)	
Mammoth Cave Natl. Park	0.033(0.002)	0.031(0.002)		0.022(0.002)	0.028(0.002)	+	0.028(0.002)	0.033(0.002)	+	0.032(0.002)	0.03(0.002)	
M.K. Goddard	0.037(0.012)	0.052(0.009)		0.026(0.013)	0.046(0.01)		0.027(0.012)	0.041(0.01)		0.037(0.012)	0.068(0.01)	
Quaker City	0.046(0.007)	0.078(0.005)	+	0.041(0.008)	0.05(0.006)		0.052(0.007)	0.064(0.006)		0.051(0.009)	0.086(0.006)	+
Shenandoah National Park	0.028(0.002)	0.038(0.002)	+	0.021(0.002)	0.026(0.002)		0.026(0.002)	0.028(0.002)		0.04(0.002)	0.039(0.002)	
Washington, D.C.	0.016(0.001)	0.018(0.001)		0.015(0.001)	0.018(0.001)		0.018(0.001)	0.018(0.001)		0.019(0.001)	0.023(0.001)	+

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-8. Nitrate Concentrations Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	282.9(28.44)	191.6(27.93)	-	251.3(25.57)	186.5(29.18)		251.4(25.44)	163.9(30.63)	-	422.3(29.18)	308(26.1)	-
Arendtsville	1624(281.2)	2254(284)		3373(393.9)	1776(317.6)	-	820.3(344.4)	1220(302.8)		3448(386.5)	2338(317.6)	-
Boundary Waters Canoe Area	384.2(105.4)	390.8(120.1)		416.4(92.57)	224.3(129.6)		104.3(103.4)	80.97(130.9)		1077(110)	933(107.6)	
Brigantine Natl. Wildlife Refuge	813.9(78.89)	525.7(73.04)	-	1038(69.41)	528.2(85.01)	-	508.7(73.48)	369.2(91.09)		1681(74.84)	991.8(74.84)	-
Bondville	2330(284.4)	2444(273.2)		3304(372.3)	3091(293.7)		1342(323.9)	1275(307.7)		3880(337.9)	3601(304)	
Connecticut Hill	714.8(145.4)	1181(138.6)	+	1473(209.9)	913.3(158.6)	-	346.2(176.3)	341(160.6)		1584(187.7)	1904(150)	
Dolly Sods Wilderness Area	440(50.63)	368.3(48.55)		668.1(45.51)	375.8(54.92)	-	222(49.71)	176.8(57.98)		767.5(53.37)	389.3(48)	-
Great Smoky Mountains Natl. Park	263.6(27.57)	232.7(27.92)		434.9(25.68)	244.6(29.71)	-	180.4(26.73)	130.8(29.93)		514.1(26.89)	246.9(26.12)	-
Jefferson/James River Face Wildlife Area	576.7(86.02)	475.7(70.47)		819.6(88.67)	367.3(85.19)	-	340.2(88.67)	255(78.65)		1203(98.37)	513.1(71.41)	-
Livonia	1283(236.7)	1464(219.6)		1795(304.5)	1864(234)		837.1(262.4)	951.2(239.6)		3385(278.8)	2308(231.4)	-
Lye Brook Wilderness Area	376.8(53.67)	364.7(50.25)		453.5(49.06)	299(55.67)	-	230.6(49.06)	156.3(56.53)		659.7(57.44)	555.4(50.88)	
Mammoth Cave Natl. Park	454.5(59.95)	449.1(55.81)		757.1(49.85)	405.6(63.46)	-	241(54.73)	279.3(64.59)		1209(52.12)	584.2(50.95)	-
M.K. Goddard	1095(175)	1453(157.6)		1550(225)	1133(169.2)		767.8(202.8)	740.7(177.1)		2333(209.5)	1933(179.2)	
Quaker City	753.8(148.5)	854.2(134.3)		1188(199.2)	799.3(150.1)		556.3(168.3)	496.3(155.5)		2576(203.3)	1534(145.3)	-
Shenandoah National Park	611.1(54.54)	391(52.16)	-	865.5(47)	356.3(58.58)	-	306.2(50.93)	211.6(65.5)		931(54.54)	431.9(50.93)	-
Washington, D.C.	1469(130.1)	1278(138.5)		1804(115.9)	939.2(149.9)	-	815.4(117.8)	593.3(147.4)		2829(145)	1902(131)	-

* The table values are in the form of mean (standard deviation) in ng/m³. A flag indicates the direction of a statistically significant change.

Table E-9. Nitrate/Sulfate Ratio Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.174(0.012)	0.161(0.012)		0.136(0.011)	0.138(0.013)		0.106(0.011)	0.089(0.013)		0.228(0.013)	0.217(0.011)	
Arendtsville	0.499(0.07)	0.589(0.07)		0.697(0.097)	0.524(0.079)		0.141(0.085)	0.225(0.075)		0.891(0.096)	0.831(0.079)	
Boundary Waters Canoe Area	0.344(0.061)	0.404(0.07)		0.181(0.053)	0.139(0.075)		0.091(0.059)	0.072(0.075)		0.629(0.063)	0.714(0.062)	
Brigantine Natl. Wildlife Refuge	0.279(0.025)	0.219(0.023)		0.291(0.022)	0.209(0.027)	-	0.128(0.023)	0.101(0.029)		0.545(0.024)	0.406(0.024)	-
Bondville	0.883(0.09)	0.85(0.086)		0.956(0.117)	1.072(0.092)		0.236(0.102)	0.252(0.097)		1.393(0.106)	1.338(0.096)	
Connecticut Hill	0.319(0.046)	0.44(0.043)		0.473(0.066)	0.427(0.05)		0.104(0.055)	0.101(0.05)		0.573(0.059)	0.714(0.047)	
Dolly Sods Wilderness Area	0.191(0.023)	0.149(0.022)		0.193(0.021)	0.156(0.025)		0.043(0.023)	0.035(0.027)		0.325(0.025)	0.213(0.022)	-
Great Smoky Mountains Natl. Park	0.11(0.014)	0.093(0.014)		0.149(0.013)	0.102(0.015)	-	0.03(0.013)	0.021(0.015)		0.232(0.014)	0.134(0.013)	-
Jefferson/James River Face Wildlife Area	0.171(0.029)	0.151(0.024)		0.239(0.03)	0.14(0.029)	-	0.054(0.03)	0.044(0.027)		0.424(0.034)	0.249(0.024)	-
Livonia	0.427(0.07)	0.458(0.065)		0.45(0.091)	0.594(0.07)		0.121(0.078)	0.165(0.071)		0.929(0.083)	0.757(0.069)	
Lye Brook Wilderness Area	0.264(0.025)	0.245(0.023)		0.23(0.023)	0.196(0.026)		0.113(0.023)	0.102(0.026)		0.377(0.027)	0.387(0.024)	
Mammoth Cave Natl. Park	0.147(0.021)	0.153(0.019)		0.203(0.017)	0.136(0.022)	-	0.042(0.019)	0.047(0.022)		0.389(0.018)	0.256(0.018)	-
M.K. Goddard	0.388(0.052)	0.429(0.047)		0.467(0.067)	0.398(0.05)		0.143(0.06)	0.131(0.052)		0.776(0.062)	0.602(0.053)	-
Quaker City	0.245(0.047)	0.285(0.043)		0.278(0.063)	0.298(0.048)		0.09(0.053)	0.096(0.049)		0.782(0.064)	0.401(0.046)	-
Shenandoah National Park	0.248(0.024)	0.171(0.023)	-	0.276(0.021)	0.158(0.026)	-	0.058(0.023)	0.049(0.029)		0.441(0.024)	0.271(0.023)	-
Washington, D.C.	0.377(0.036)	0.403(0.039)		0.386(0.033)	0.306(0.042)		0.113(0.033)	0.122(0.041)		0.717(0.041)	0.717(0.037)	

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-10. Selenium/Sulfate Ratio^(a) Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	0.223(0.019)	0.18(0.018)		0.152(0.017)	0.203(0.019)	+	0.153(0.017)	0.133(0.02)		0.24(0.019)	0.224(0.017)	
Arendtsville	0.36(0.176)	0.439(0.143)		0.307(0.198)	0.371(0.166)		0.731(0.188)	0.226(0.152)	-	0.423(0.202)	0.603(0.16)	
Boundary Waters Canoe Area	0.217(0.02)	0.26(0.023)		0.139(0.017)	0.143(0.024)		0.195(0.019)	0.161(0.024)		0.185(0.021)	0.135(0.02)	
Brigantine Natl. Wildlife Refuge	0.353(0.028)	0.427(0.026)	+	0.25(0.024)	0.306(0.03)		0.219(0.026)	0.207(0.032)		0.499(0.026)	0.603(0.026)	+
Bondville	0.416(0.052)	0.44(0.039)		0.394(0.055)	0.502(0.042)		0.305(0.047)	0.338(0.044)		0.393(0.048)	0.445(0.043)	
Connecticut Hill	0.322(0.065)	0.504(0.048)	+	0.294(0.076)	0.473(0.055)		0.203(0.061)	0.326(0.055)		0.466(0.066)	0.659(0.053)	+
Dolly Sods Wilderness Area	0.417(0.041)	0.608(0.039)	+	0.346(0.037)	0.497(0.044)	+	0.201(0.04)	0.252(0.047)		0.665(0.043)	0.757(0.039)	
Great Smoky Mountains Natl. Park	0.329(0.024)	0.373(0.024)		0.261(0.022)	0.32(0.026)		0.145(0.023)	0.169(0.026)		0.452(0.023)	0.444(0.023)	
Jefferson/James River Face Wildlife Area	0.402(0.037)	0.446(0.031)		0.331(0.039)	0.406(0.037)		0.174(0.039)	0.187(0.034)		0.742(0.043)	0.657(0.031)	
Livonia	0.353(0.077)	0.443(0.055)		0.337(0.075)	0.489(0.058)		0.187(0.065)	0.301(0.059)		0.533(0.069)	0.625(0.058)	
Lye Brook Wilderness Area	0.238(0.029)	0.293(0.027)		0.167(0.027)	0.212(0.03)		0.166(0.027)	0.212(0.031)		0.333(0.031)	0.396(0.028)	
Mammoth Cave Natl. Park	0.35(0.034)	0.426(0.032)		0.296(0.028)	0.452(0.036)	+	0.187(0.031)	0.244(0.037)		0.543(0.03)	0.595(0.029)	
M.K. Goddard	0.616(0.19)	0.939(0.154)		0.413(0.214)	0.979(0.161)	+	0.203(0.199)	0.426(0.168)		0.679(0.203)	1.062(0.17)	
Quaker City	0.501(0.288)	0.741(0.219)		0.441(0.328)	0.538(0.245)		0.281(0.275)	0.336(0.261)		0.727(0.35)	1.441(0.237)	
Shenandoah National Park	0.34(0.033)	0.496(0.032)	+	0.263(0.028)	0.377(0.035)	+	0.176(0.031)	0.2(0.04)		0.519(0.033)	0.7(0.031)	+
Washington, D.C.	0.534(0.042)	0.635(0.045)		0.409(0.038)	0.588(0.049)	+	0.313(0.038)	0.339(0.048)		0.703(0.047)	1.026(0.042)	+

(a) All numbers in table multiplied by 1,000.

* The table values are in the form of mean (standard deviation). A flag indicates the direction of a statistically significant change.

Table E-11. Organic Carbon Concentrations Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	949.8(78.2)	916.3(75.87)		781.3(70.3)	700.7(79.2)		1711(70.3)	1508(83.6)		1126(79.71)	826.4(71.76)	-
Arendtsville	1556(229.1)	1745(183.3)		1740(282.8)	1317(210.2)		2978(232.7)	2583(197.6)		2600(249.4)	1139(202.4)	-
Boundary Waters Canoe Area	834.6(96.71)	1116(110.2)		637.4(84.91)	842.2(118.8)		1980(104)	1661(120.1)	-	784(100.9)	746(99.44)	
Brigantine Natl. Wildlife Refuge	1683(113.7)	1710(102.4)		1393(98.15)	1282(112.9)		2068(104.8)	2150(122.4)		1924(108)	1673(104.2)	
Bondville	1895(197.5)	1636(142.3)		1611(214)	1143(153)		2426(168.7)	1840(160.3)	-	1400(178.6)	773.6(158.3)	-
Connecticut Hill	1315(186.1)	1207(132.8)		1071(220.2)	779(152)		2457(168.9)	2073(152)		1487(176.9)	855.6(150.2)	-
Dolly Sods Wilderness Area	1594(116.8)	1840(106.9)		1661(102.5)	1717(116.8)		2282(111.2)	1925(120.8)	-	1749(121.6)	1856(106.3)	
Great Smoky Mountains Natl. Park	1871(110.7)	2212(107.4)	+	1797(102.7)	2087(112.9)		2720(106.8)	2877(116.7)		1387(110.1)	1579(102.7)	
Jefferson/James River Face Wildlife Area	3000(217.1)	3334(168.8)		2409(230)	2529(189.8)		3290(227.7)	3306(184.7)		3675(254.6)	3616(163.5)	
Livonia	1873(215.9)	1847(152.6)		1829(241.3)	1322(162.7)		2859(182.4)	2450(166.5)		1946(204)	1101(160.9)	-
Lye Brook Wilderness Area	795.1(87.29)	991.7(79.98)		786.7(78.54)	950.3(86.03)		1641(79.01)	1601(87.94)		858.3(90.69)	867.5(82.03)	
Mammoth Cave Natl. Park	1954(129.2)	2224(112.1)		1795(110.3)	1833(121.3)		2660(119.8)	2646(128.3)		1874(113.4)	1645(108.5)	
M.K. Goddard	1908(222.5)	1998(170.2)		1730(264.2)	1543(182.7)		2796(226.2)	2750(191.2)		2084(226.2)	1216(195.9)	-
Quaker City	1651(201.1)	1814(144.8)		1418(237.9)	1260(160.4)		3058(182.5)	2044(170.4)	-	1673(226.9)	1057(155.2)	-
Shenandoah National Park	1527(109.3)	1605(101.5)		1290(96.1)	1396(110)		2474(102.1)	2327(115.6)		1050(110.8)	1001(106.5)	
Washington, D.C.	2976(162.3)	2915(159.4)		2388(146.8)	2153(168.7)		3275(147.5)	2855(169.8)		3309(175.8)	2794(153.1)	-

* The table values are in the form of mean (standard deviation) in ng/m³. A flag indicates the direction of a statistically significant change.

Table E-12. Trace Metals Concentrations Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	24.67(2.312)	27.02(2.204)		28.5(2.057)	31.57(2.341)		35.68(2.068)	33.16(2.454)		29.53(2.356)	30.99(2.121)	
Arendtsville	37.37(4.672)	47.86(3.796)		40.61(5.264)	50.19(4.413)		42.12(4.984)	42.61(4.046)		54.21(5.368)	43.99(4.192)	
Boundary Waters Canoe Area	38.05(5.782)	42.29(6.531)		43.42(5.076)	45.33(6.965)		48.53(5.668)	44.84(7.179)		40.8(6.032)	50.89(5.903)	
Brigantine Natl. Wildlife Refuge	62.67(3.762)	58.69(3.351)		63.34(3.247)	53.41(3.736)	-	69.98(3.466)	60.99(3.956)		65.81(3.571)	59.08(3.407)	
Bondville	41.91(5.987)	45.75(4.471)		51.21(6.323)	56.36(4.806)		60.66(5.374)	58.78(5.035)		49.46(5.529)	36.09(4.975)	
Connecticut Hill	31.76(3.79)	36.78(2.799)		33.9(4.426)	37.19(3.203)		33.61(3.56)	41.18(3.203)		35.13(3.79)	32.8(3.095)	
Dolly Sods Wilderness Area	37.19(2.692)	41.54(2.526)		49.98(2.423)	47.14(2.761)		59.3(2.628)	52.19(2.836)		33.06(2.855)	32.65(2.512)	
Great Smoky Mountains Natl. Park	39.49(3.192)	45.9(3.061)		54.22(2.945)	54.13(3.254)		65.52(3.079)	66.81(3.342)		31.57(3.134)	31.83(2.961)	
Jefferson/James River Face Wildlife Area	73.11(5.119)	65.54(3.979)		99.26(5.423)	76.52(4.474)	-	78.95(5.369)	72.64(4.354)		87.43(6.002)	70(3.854)	-
Livonia	30.94(5.345)	43.84(3.818)		41.62(5.242)	53.43(4.029)		44.3(4.518)	51.46(4.124)		40.69(4.725)	41.76(4.029)	
Lye Brook Wilderness Area	26.34(3.144)	31.55(2.908)		36.7(2.857)	37.79(3.166)		38.26(2.873)	35.81(3.212)		28.22(3.337)	29.83(2.962)	
Mammoth Cave Natl. Park	41.53(3.292)	52.47(2.856)	+	58.87(2.764)	60.21(3.091)		66.95(3.051)	57.92(3.198)	-	56.9(2.889)	51.51(2.75)	
M.K. Goddard	56.33(6.617)	83.71(5.376)	+	52.64(7.455)	66.28(5.605)		62.25(6.94)	69.4(5.865)		67.87(7.059)	62.92(5.937)	
Quaker City	51.2(5.256)	46.97(3.982)		59.21(5.974)	42.65(4.463)	-	58.64(5.019)	44(4.747)	-	56.88(6.386)	37.97(4.315)	-
Shenandoah National Park	41.93(2.974)	42.7(2.751)		51.5(2.597)	50.29(3.034)		60.82(2.815)	52.98(3.165)		31.18(3.014)	30.82(2.782)	
Washington, D.C.	160.9(7.965)	156.2(7.73)		146.5(7.205)	124.9(8.223)	-	143.2(7.241)	123.4(8.277)		162.8(8.63)	150(7.515)	

* The table values are in the form of mean (standard deviation) in ng/m³. A flag indicates the direction of a statistically significant change.

Table E-13. Sulfate Concentrations Trends Table* Comparing Means Before June 1996 to the Means After June 1996

Site	Autumn		Flag	Spring		Flag	Summer		Flag	Winter		Flag
	Before	After		Before	After		Before	After		Before	After	
Acadia National Park	1633(212.2)	1508(208.3)		2028(190.8)	1433(217.7)	-	3703(189.8)	2936(228.5)	-	1899(217.7)	1508(194.7)	
Arendtsville	3724(598.7)	5188(604.7)		4551(838.5)	3969(676)		8736(733.3)	8998(644.6)		4028(822.8)	3147(676)	
Boundary Waters Canoe Area	1011(124.9)	1032(142.4)		1649(109.7)	1242(153.5)	-	1314(122.5)	1531(155.1)		1513(130.3)	1423(127.6)	
Brigantine Natl. Wildlife Refuge	3724(333.1)	3054(308.4)		4136(293.1)	2803(358.9)	-	6366(310.2)	5670(384.6)		3230(316)	2717(316)	
Bondville	4051(513.7)	4282(493.6)		3507(672.6)	3274(530.6)		8128(585.1)	6858(555.9)		3100(610.4)	2897(549.2)	
Connecticut Hill	3337(587.7)	4766(560.3)		3189(848.2)	2552(641.2)		6961(712.6)	7993(649)		3043(758.7)	2746(606.1)	
Dolly Sods Wilderness Area	3945(340)	3496(326.1)		3960(305.7)	3057(368.8)		8878(333.8)	7629(389.4)	-	2529(358.4)	2432(322.4)	
Great Smoky Mountains Natl. Park	4430(335.3)	4161(339.6)		4138(312.4)	3300(361.4)		8860(325.2)	8559(364.1)		2453(327.1)	2335(317.7)	
Jefferson/James River Face Wildlife Area	4893(407.4)	4071(333.7)		4254(419.9)	3485(403.4)		8107(419.9)	7613(372.5)		2946(465.8)	2716(338.2)	
Livonia	4620(581.9)	5083(539.7)		4158(748.4)	4158(575.3)		10187(645)	8946(588.8)		4001(685.4)	3396(568.9)	
Lye Brook Wilderness Area	1781(254.6)	1921(238.4)		2111(232.7)	1693(264.1)		3758(232.7)	3140(268.2)		1740(272.5)	1563(241.4)	
Mammoth Cave Natl. Park	4777(372.8)	4190(347)		4583(310)	3533(394.6)	-	9252(340.3)	7465(401.6)	-	3698(324.1)	2935(316.8)	
M.K. Goddard	3536(658.4)	5243(593)		3645(846.7)	3540(636.5)		9089(763.2)	8759(666.2)		3397(788.2)	3621(674.2)	
Quaker City	5011(676.2)	5726(611.6)		4831(907.2)	4171(683.8)		10911(766.7)	8932(708.4)		3720(925.9)	3757(661.6)	
Shenandoah National Park	4338(324.2)	3302(310)	-	3849(279.4)	3018(348.2)		8451(302.7)	6530(389.3)	-	2372(324.2)	2071(302.7)	
Washington, D.C.	4769(351.2)	3977(373.8)		5224(312.9)	3405(404.7)	-	8690(317.9)	6676(397.9)	-	4151(391.4)	3145(353.6)	

* The table values are in the form of mean (standard deviation) in ng/m³. A flag indicates the direction of a statistically significant change.