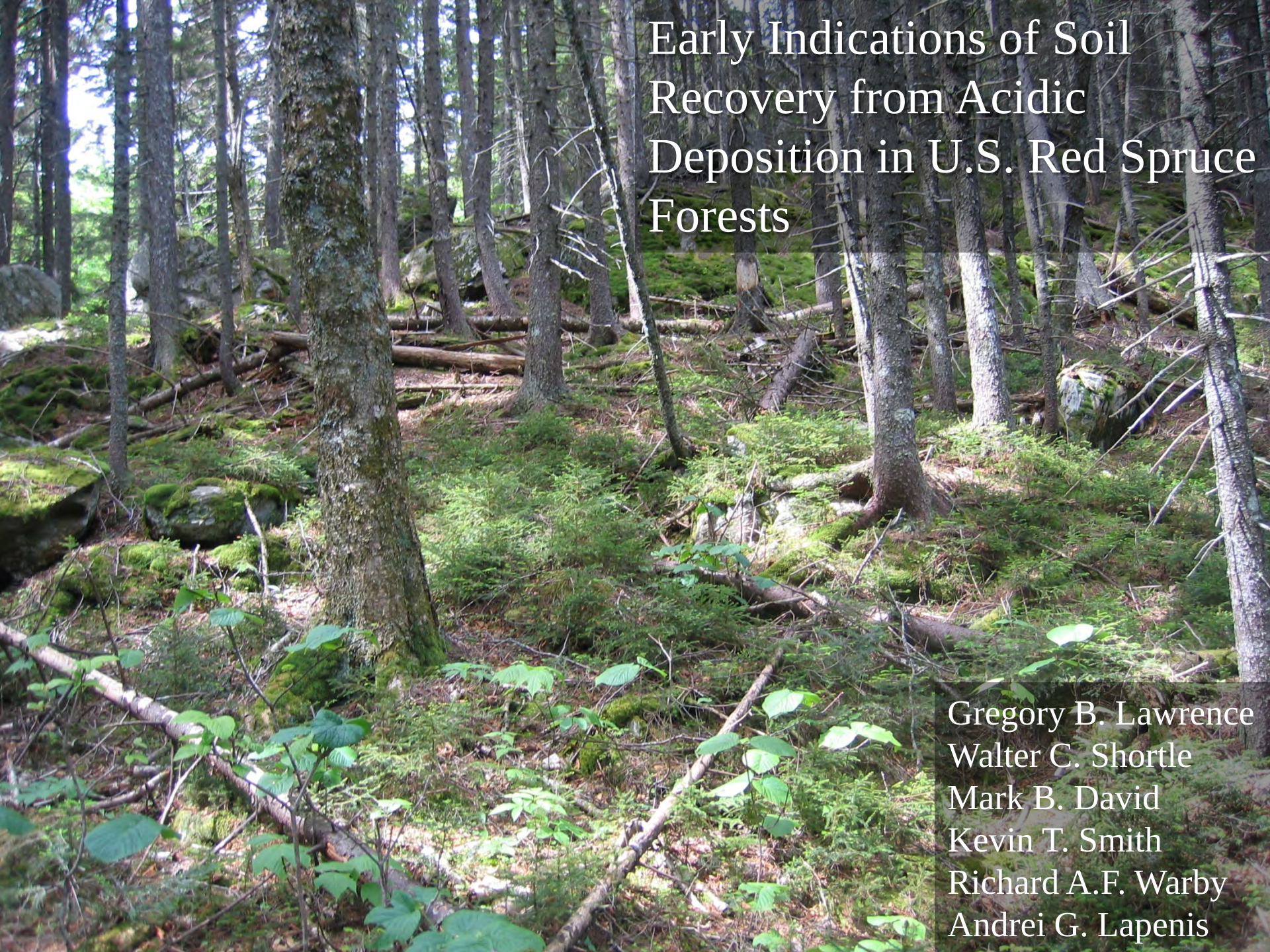

Early Indications of Soil Recovery from Acidic Deposition in U.S. Red Spruce Forests

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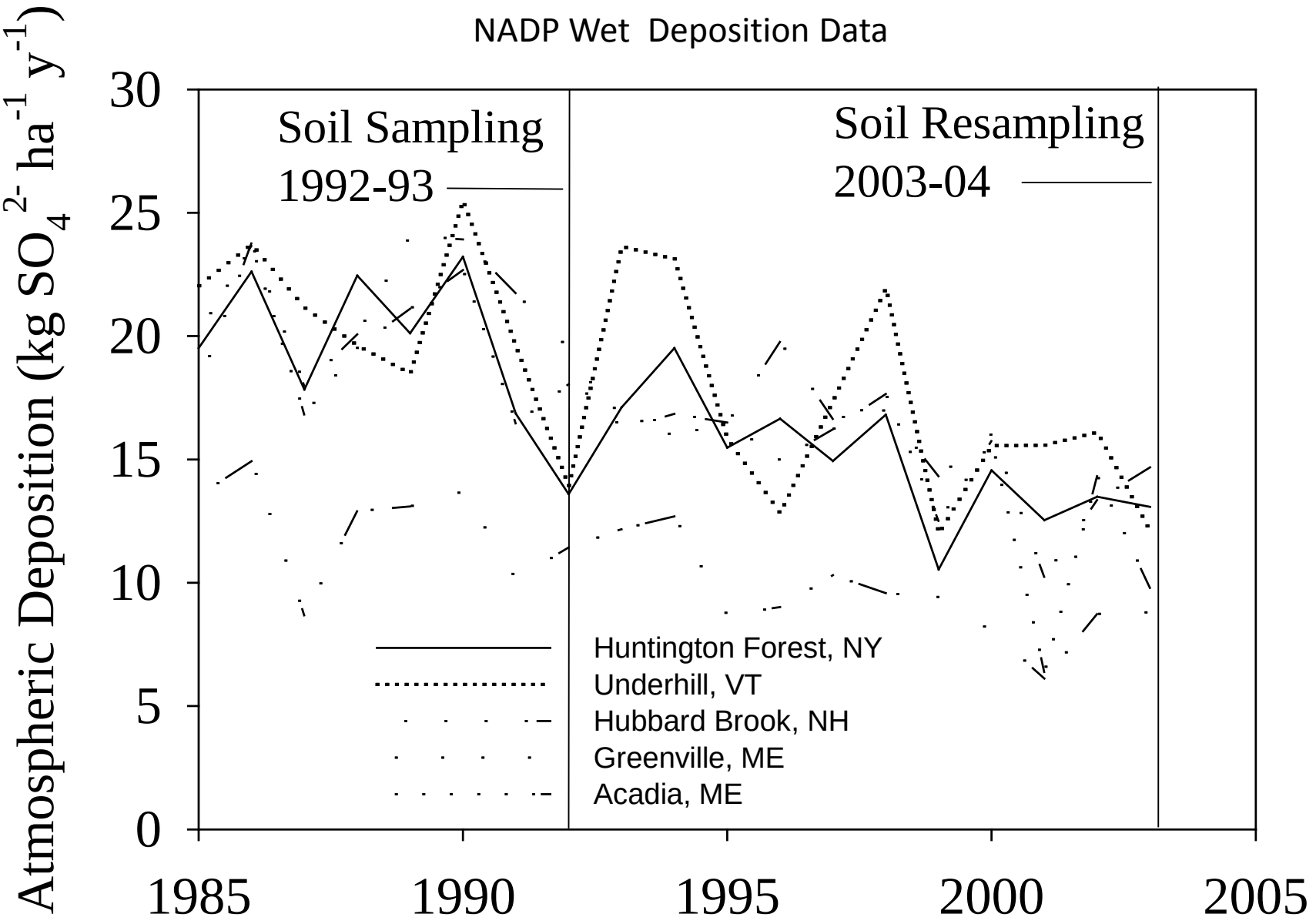
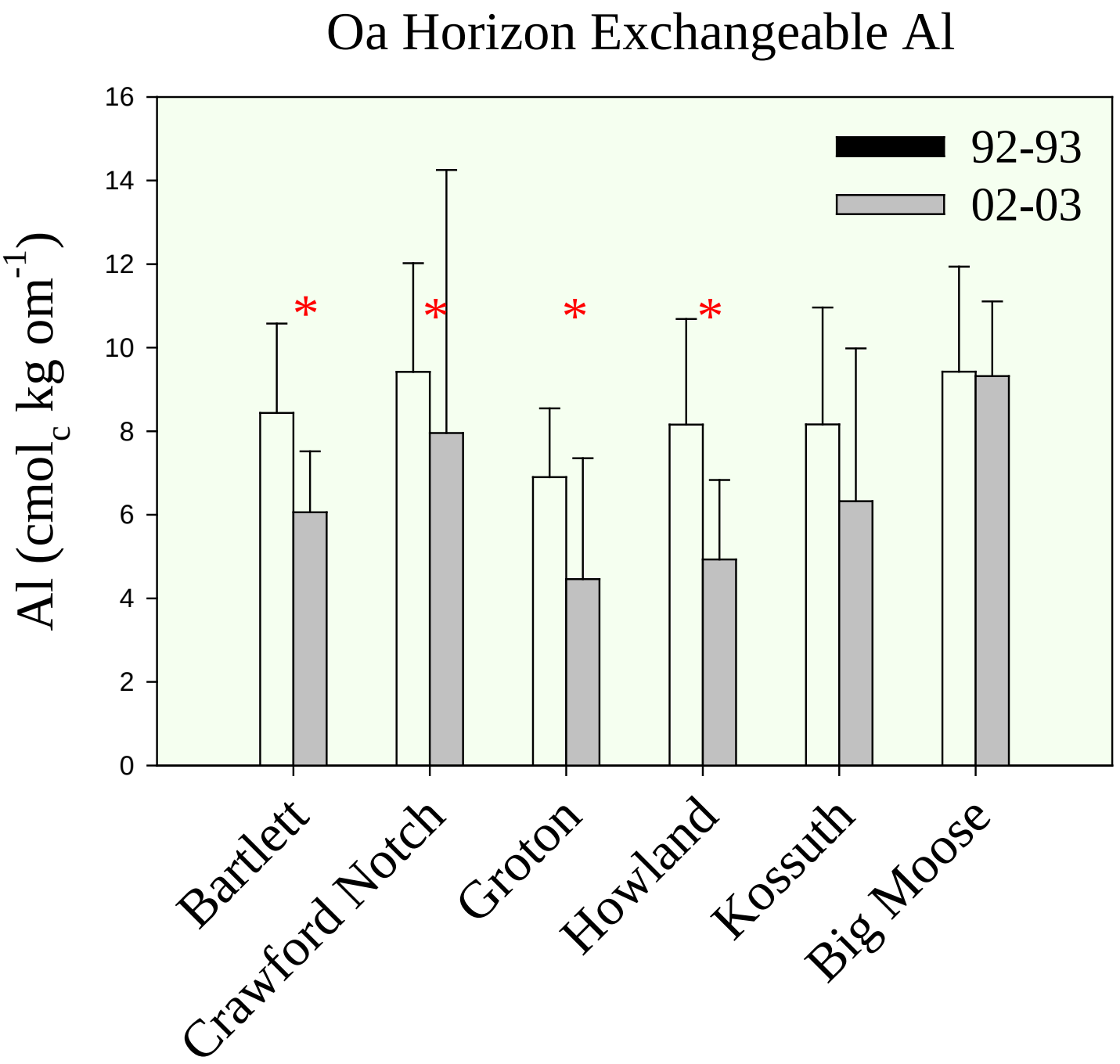

NADP Wet Deposition Data
Atmospheric Deposition (kg SO_4^{2-} ha^{-1} y^{-1})
30
25
20
15
10
5
0
1985
1990
1995
2000
2005
Soil Sampling
1992-93
Soil Resampling
2003-04
Huntington Forest, NY
Underhill, VT
Hubbard Brook, NH
Greenville, ME
Acadia, ME


Oa Horizon Exchangeable Al
Al (cmol$_c$ kg om^{-1})
16
14
12
10
8
6
4
2
0
92-93
02-03
*
*
*
*
Bartlett
Crawford Notch
Groton
Howland
Kossuth
Big Moose

Repeated Analysis of Samples collected in 1992-93

	Oa Horizon	
Analysis	Analyzed in 1992-94	Reanalyzed in 2007-08
Exch. Ca^{2+}	9.3	8.2
Exch. Mg^{2+}	2.3	2.0
Exch. Na^{+}	0.32	0.32
Exch. K^{+}	1.2	1.3
Exch. Al	6.3	7.1
pH	2.70	2.70
LOI	2.7	2.7
C	47.0	46.8
N	1.4	1.6

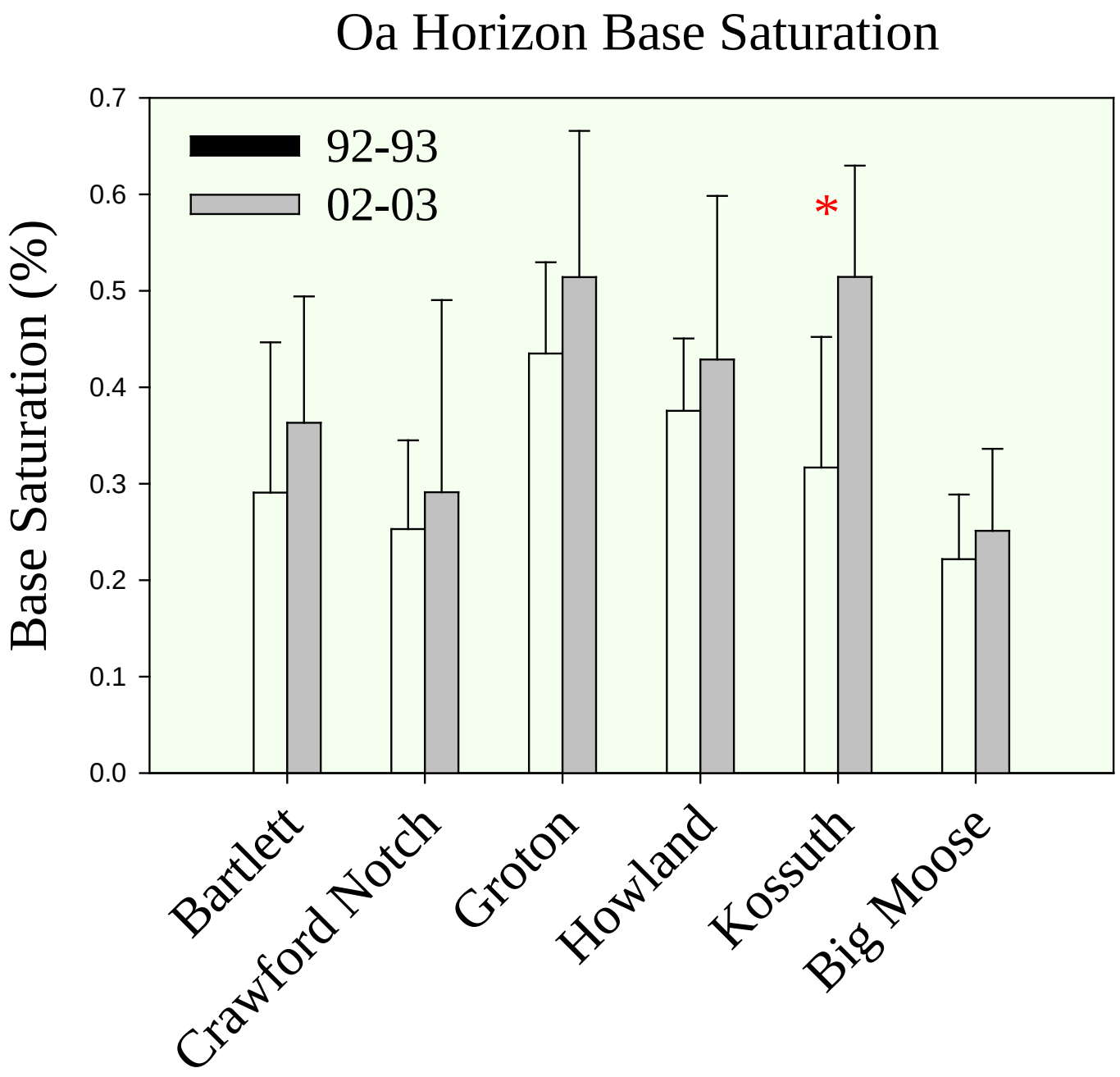
Repeated Analysis of Samples collected in 1992-93

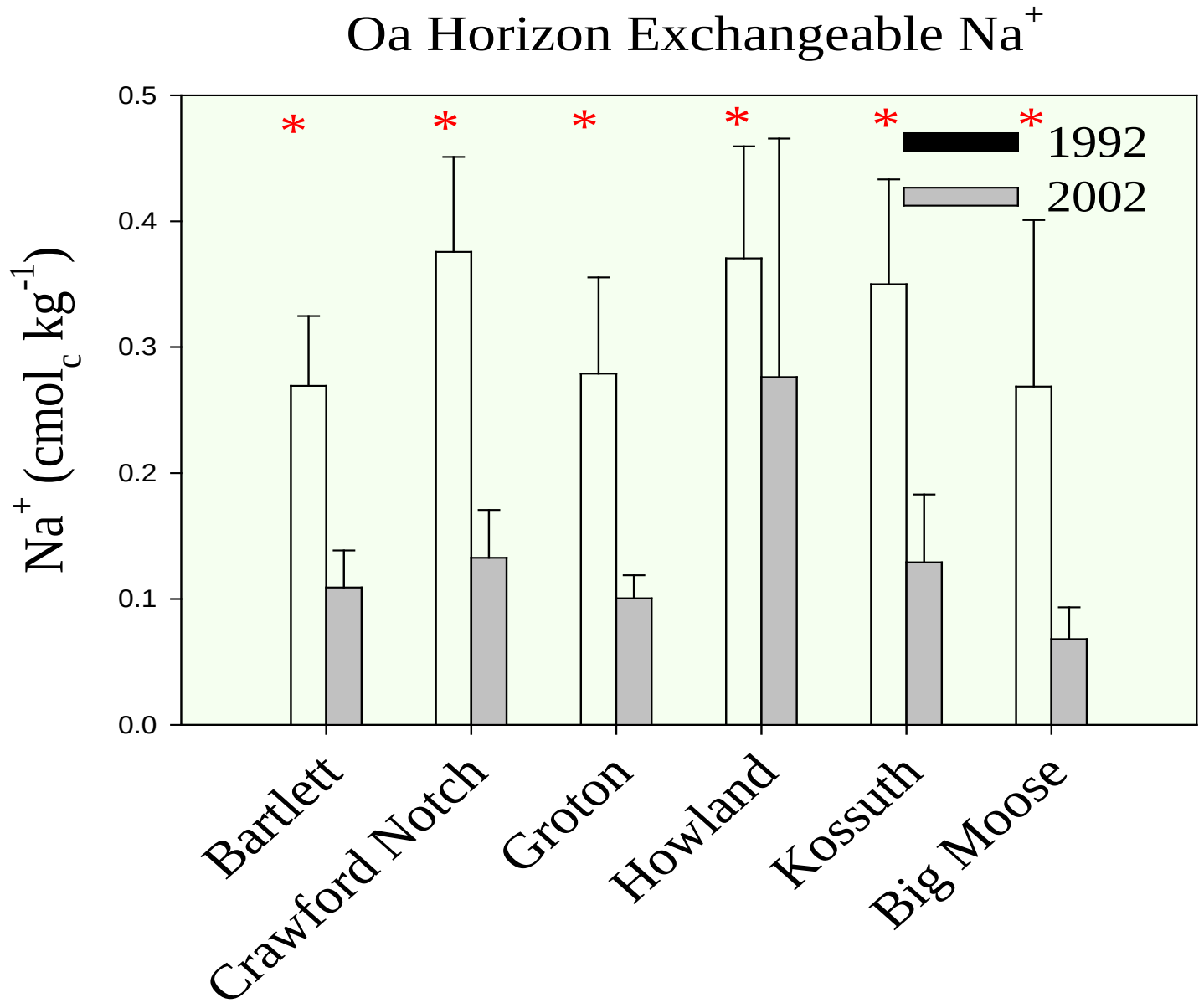
	Upper B Horizon	
Analysis	Analyzed in 1992-94	Analyzed in 2007-08
Exch. Mg^{2+}	0.073	0.059
Exch. Na^{+}	0.058	0.060
Exch. K^{+}	0.090	0.070
Exch. H^{+}	0.8	1.0
LOI	11.1	11.3
C	5.5	5.4
N	0.19	0.21

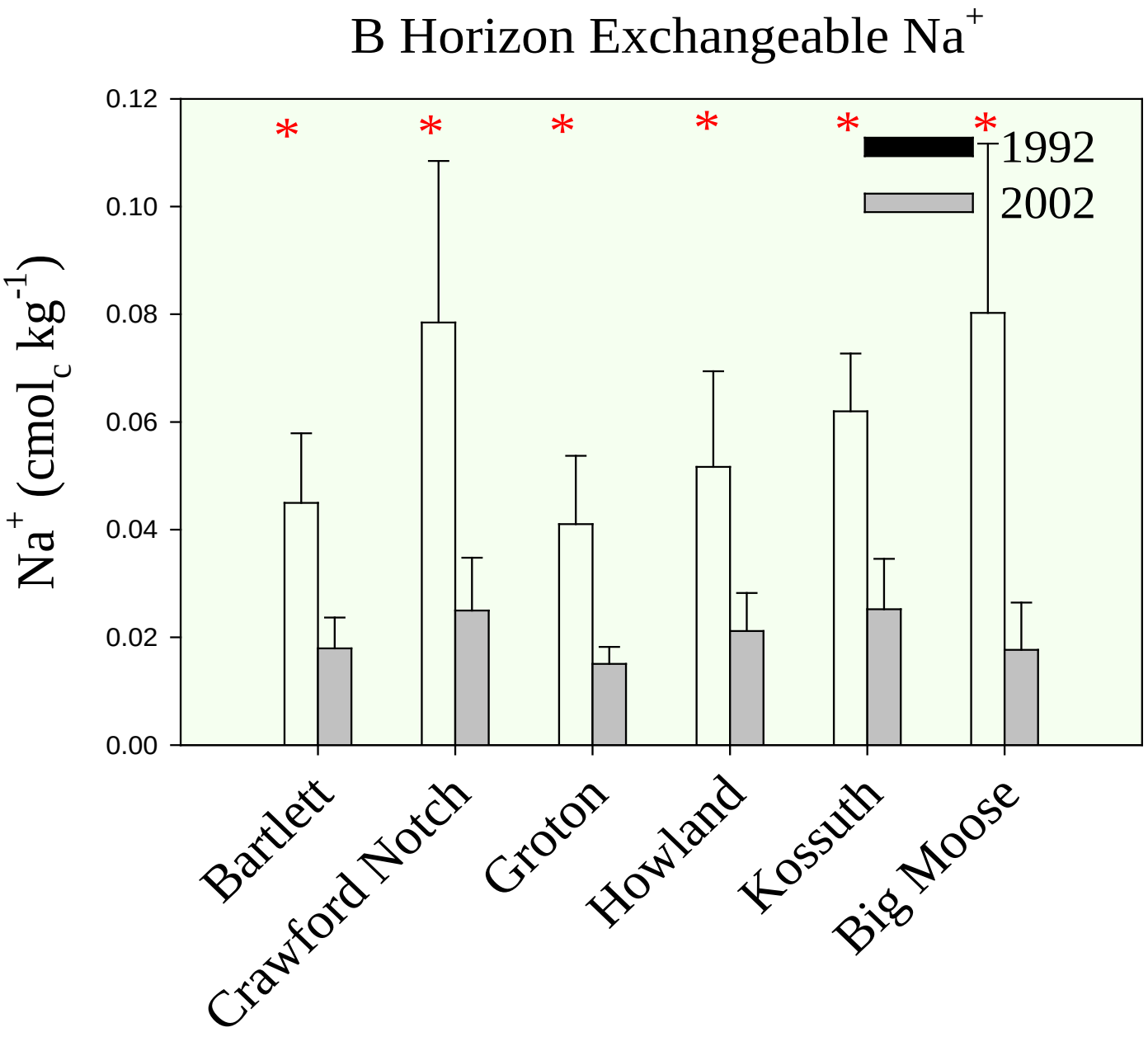
Repeated Analysis of Samples collected in 1992-93

	Upper B Horizon								Oa Horizon	
	Ca^{2+}		Al		pH		Exch. H+		Exch. H^{+}	
	1992 -94	2007 -08	1992 -94	2007 -08	1992 -94	2007 -08	1992 -94	2007 -08	1992 -94	2007 -08
Big Moose Lake, NY	0.18	0.10	9.9	***3.6***	3.93	***3.71***	1.60	1.94	15.8	***19.8***
Groton, VT	0.32	0.11	1.6	1.3	3.91	***3.73***	0.25	***0.14***	11.5	***16.9***
Crawford Notch, NH	0.30	***0.17***	8.0	***3.6***	4.46	***4.28***	1.10	1.47	14.8	***19.0***
Bartlett, NH	0.19	0.10	4.4	***2.9***	4.13	***3.91***	0.59	0.64	14.9	***19.7***
Howland, ME	0.19	***0.10***	4.1	2.9	4.15	***3.92***	0.50	0.66	13.1	***15.6***
Kossuth, ME	0.37	***0.21***	6.4	***4.4***	3.58	***3.39***	0.50	***1.21***	11.9	15.3

What if we *resampled* the Oa horizon too deep/too shallow


Oa Horizon Base Saturation
Base Saturation (%)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
92-93
02-03
*
Bartlett
Crawford Notch
Groton
Howland
Kossuth
Big Moose


Oa Horizon Exchangeable Na+
Na+ (cmolc kg-1)
0.5
0.4
0.3
0.2
0.1
0.0
1992
2002
Bartlett
Crawford Notch
Groton
Howland
Kossuth
Big Moose


B Horizon Exchangeable Na+
Na+ (cmolc kg-1)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1992
2002
Bartlett
Crawford Notch
Groton
Howland
Kossuth
Big Moose

Other Studies

Warby et al., 2009

1984 -- 0. 2 cmolc kg-1

2001 -- 0.0 (<0.01)

Hazlett et al., 2011

Ae	1986	0.04	
	2003/05	0.03	(0.03)
Bhf1	1986	0.04	
	2003/05	0.03	(0.28)
Bhf2	1986	0.04	
	2003/05	0.03	(0.46)
Bf1	1986	0.04	
	2003/05	0.02	(0.01)
Bf2	1986	0.04	
	2003-05	0.02	(<0.01)
IIBC	1986	0.03	
	2003/05	0.011	(0.04)
IIC	1986	0.02	
	2003/05	0.01	(0.01)

Changes in Oa horizon Organic Matter Mass

	Mg ha^{-1}		Difference
Site	**1992-93**	**2003-04**	**Mg ha^{-1} y^{-1}**
Big Moose Lake	175.0	161.7	-1.2
Groton	42.8	17.6	-2.3
Crawford Notch	79.0	45.7	-3.0
Bartlett	86.2	66.3	-1.8
Howland	67.3	56.6	-1.0
Kossuth	21.6	30.6	0.8
Czech Republic			**-4.6**

11-year inputs of litter, roots and wood ~ 57 Mg ha^{-1}

Assumed No Change in Horizon Thickness

Site	**Difference** **(Mg ha^{-1})**	**Difference** *No Change in Thickness* **(Mg ha^{-1})**
Big Moose Lake	-13	19.9
Groton	-25	-1.4
Crawford Notch	-33	-5.1
Bartlett	-20	-10.8
Howland	-11	1.1
Kossuth	9	-0.8