Changes in Water Chemistry in Adirondack Lakes and Streams: A Status Report

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NYSERDA Environmental Monitoring, Evaluation, & Protection

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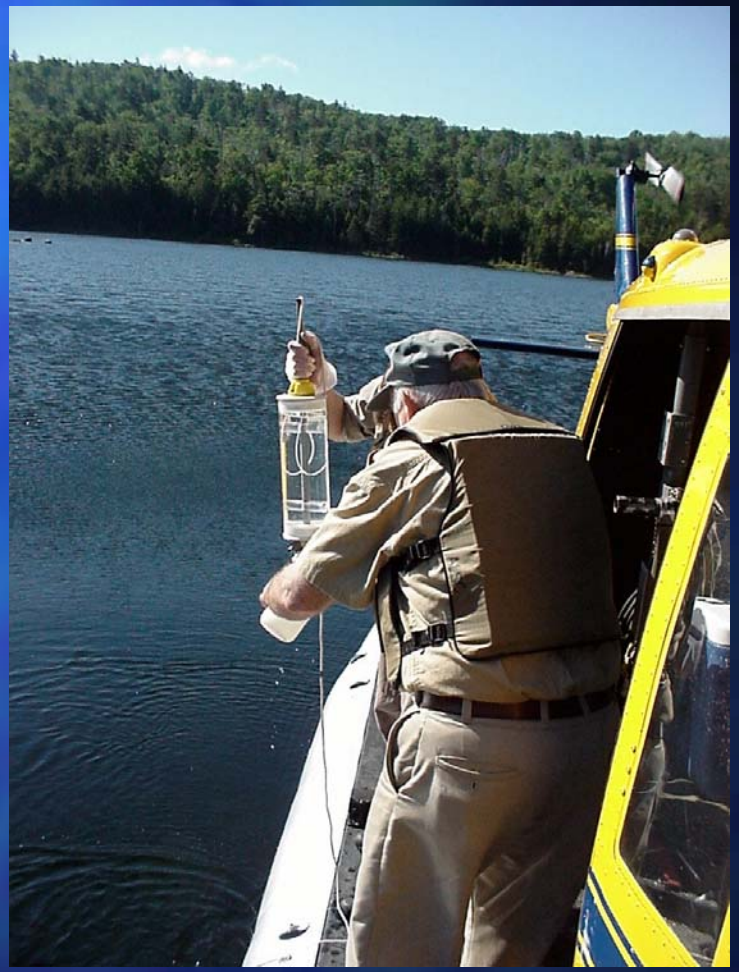
Albany, NY

1984-1987

- Physical, biological and chemical surveys on 1469 waters.
- Extent of lake acidification.
- 1990 Interpretive Report.



LTM Lake Classification

(Hydrology, Flowpath, Chemistry, Watershed Characteristics)

- Thick Till/Carbonate 5 lakes
- Medium Till 13 lakes
- Thin Till 27 lakes
- Mounded Seepages 7 lakes

TOTAL 52 lakes

ALSC Long Term Monitoring Program
1992 - present

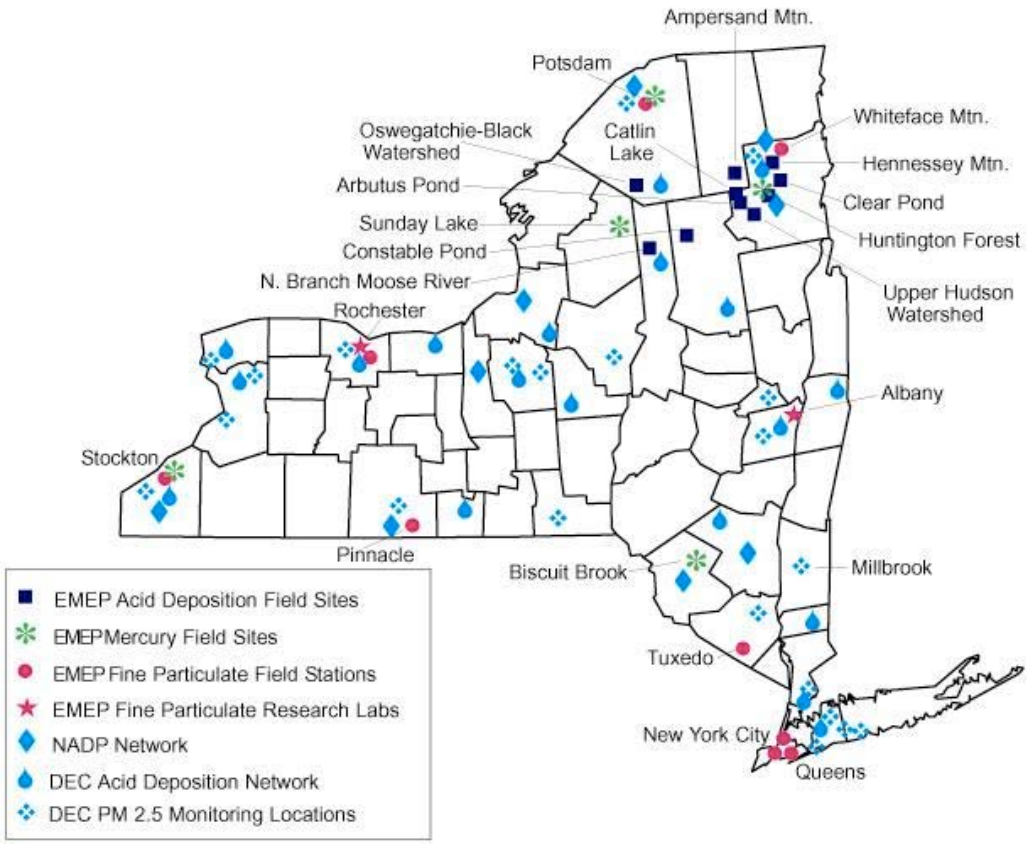
*52 lakes, 33 streams

*summer survey w/EPA over the Northeastern US

*peer review and outreach

evaluate the effectiveness of the CAAA of 1990

NYSERDA's EMEP Field Stations Research Sites



ALSC scientific associates

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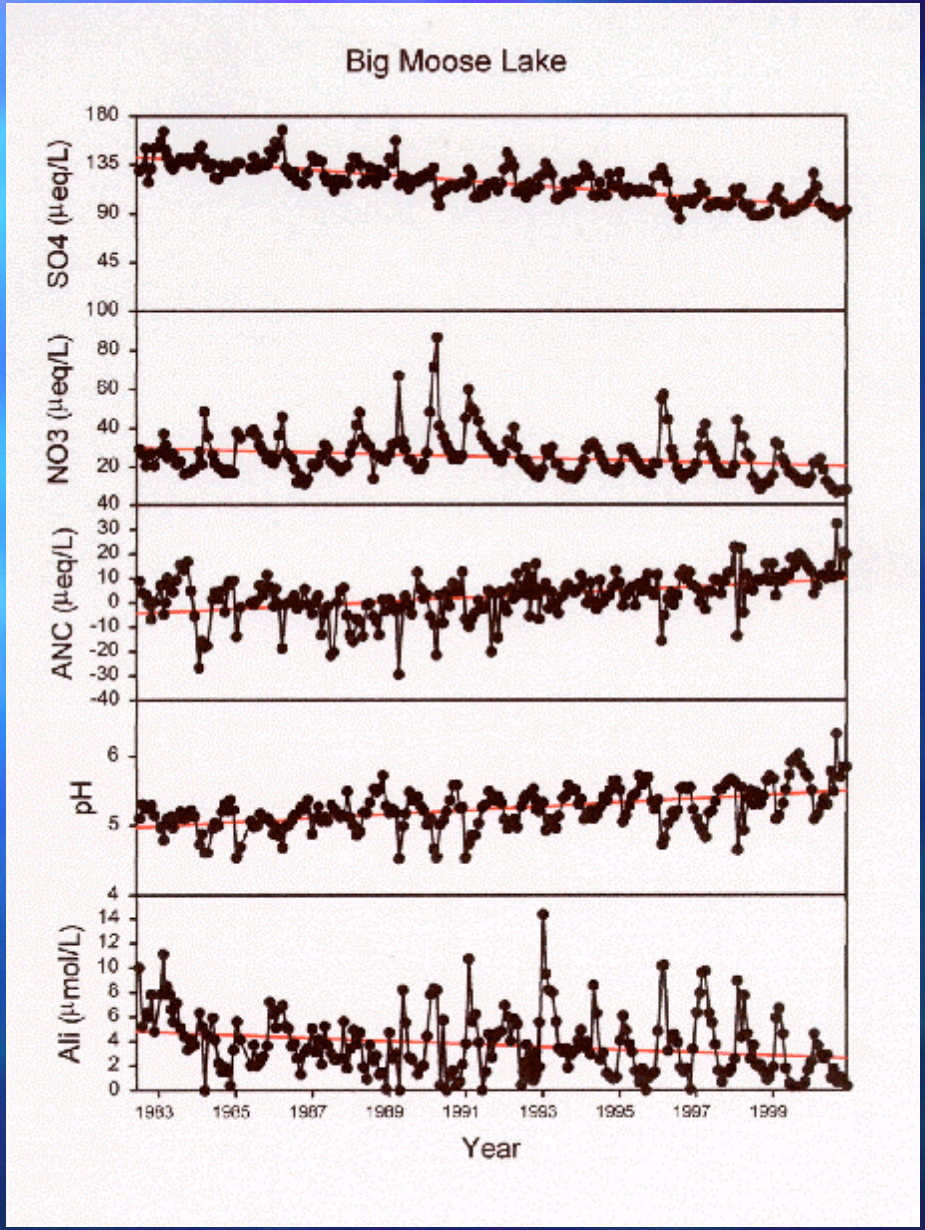
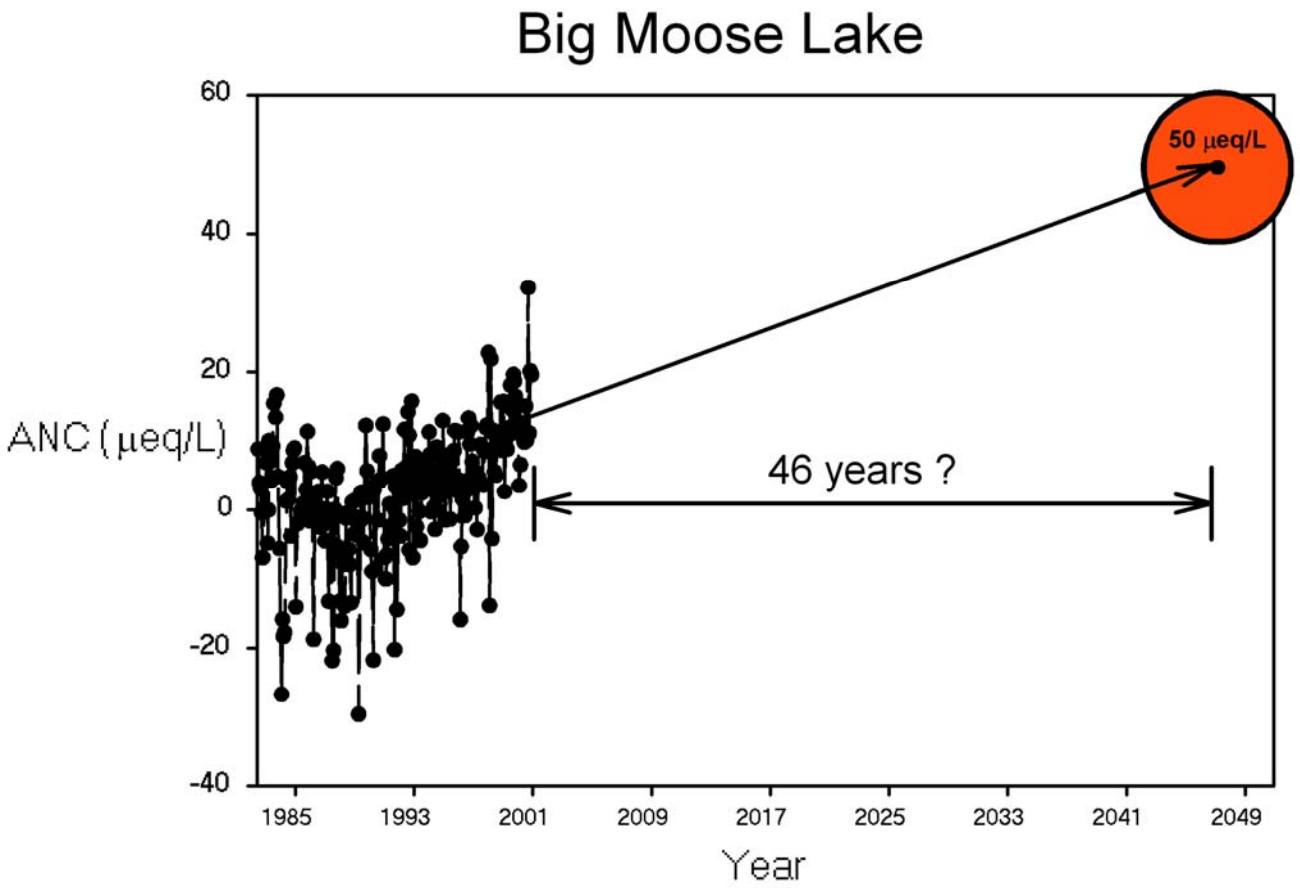
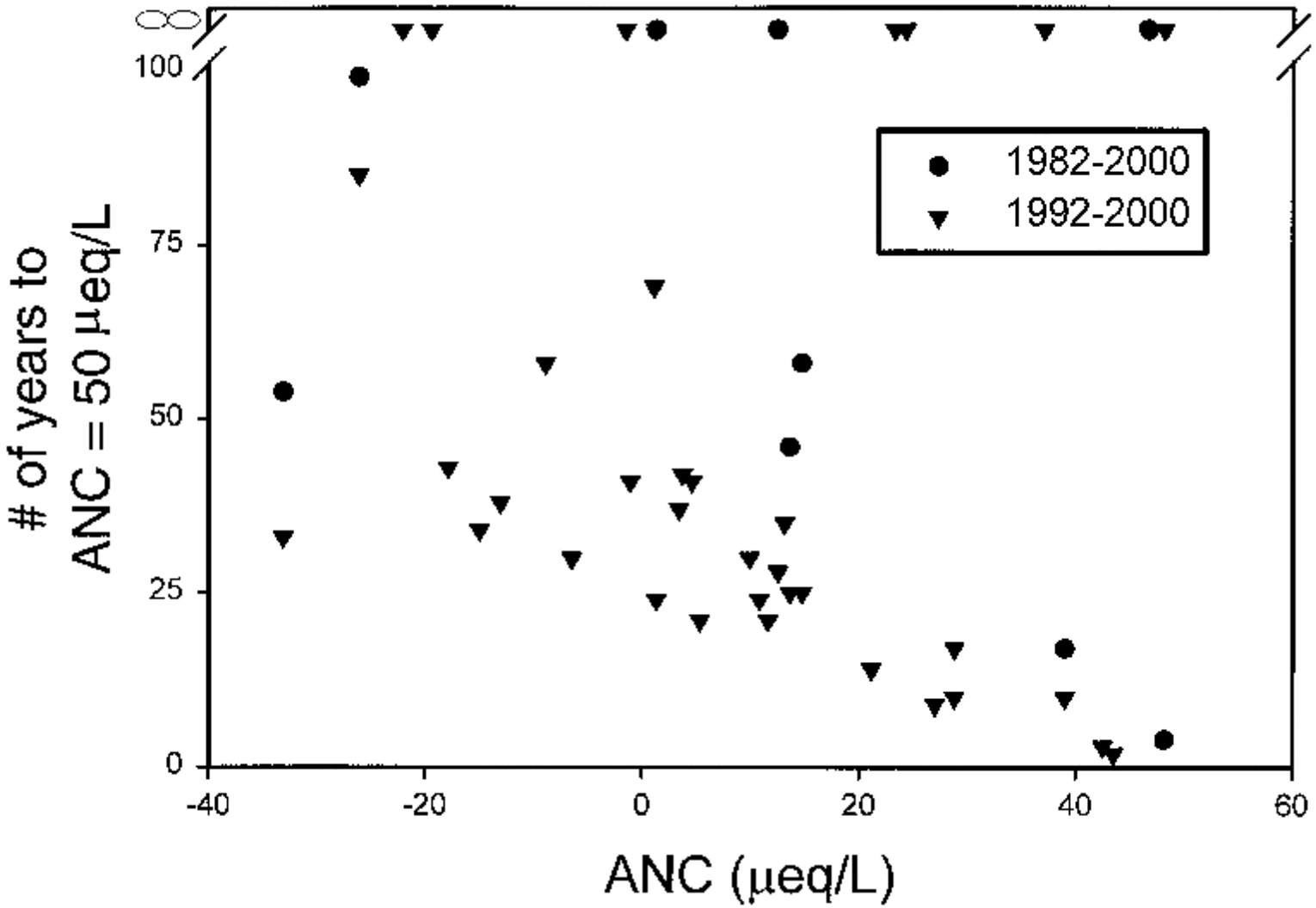

Big Moose Lake
SO4 (µeq/L)
NO3 (µeq/L)
ANC (µeq/L)
pH
Ali (µmol/L)
Year
1983
1985
1987
1989
1991
1993
1995
1997
1999

1992-2000 Results in 48 Lakes

- Extensive improvement in SO_4
- Varied improvement in NO_3
- Improved ANC in 29 lakes
- Decreased toxic Al in 28 lakes
- Improved pH in 18 lakes,
  2 lakes declining


Big Moose Lake
60
40
20
0
-20
-40
ANC (μeq/L)
50 μeq/L
46 years ?
1985
1993
2001
2009
2017
2025
2033
2041
2049
Year


∞
100
75
50
25
0
# of years to
ANC = 50 µeq/L
-40
-20
0
20
40
60
ANC (µeq/L)
1982-2000
1992-2000

Remember…

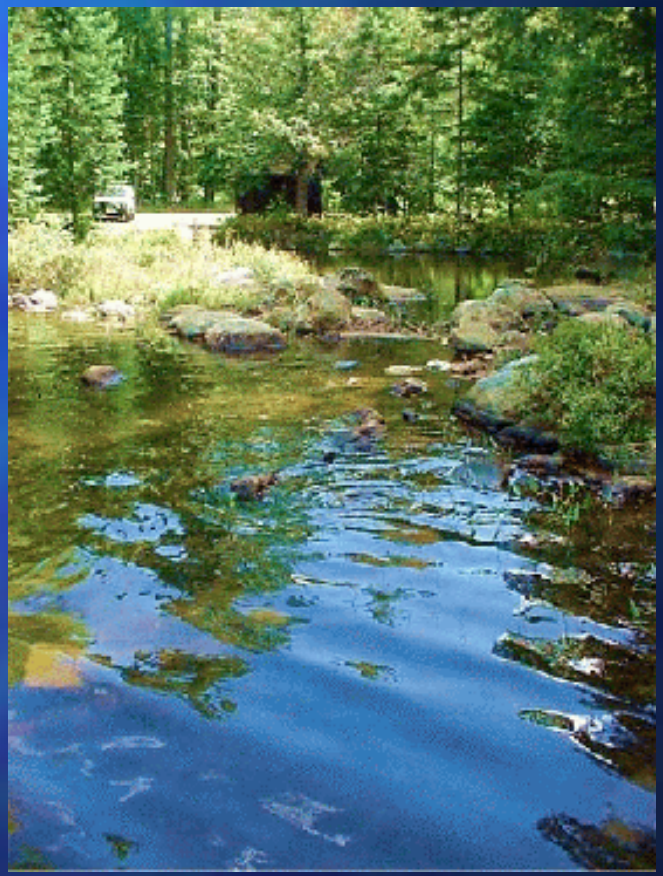
- Trend data do not show lake recovery is complete, only that it is starting.
- The rate of lake chemistry improvement is slow.
- Current levels of pH, ANC and Al still critical in many lakes.

Fisheries Survey Comparisons 1984-2003

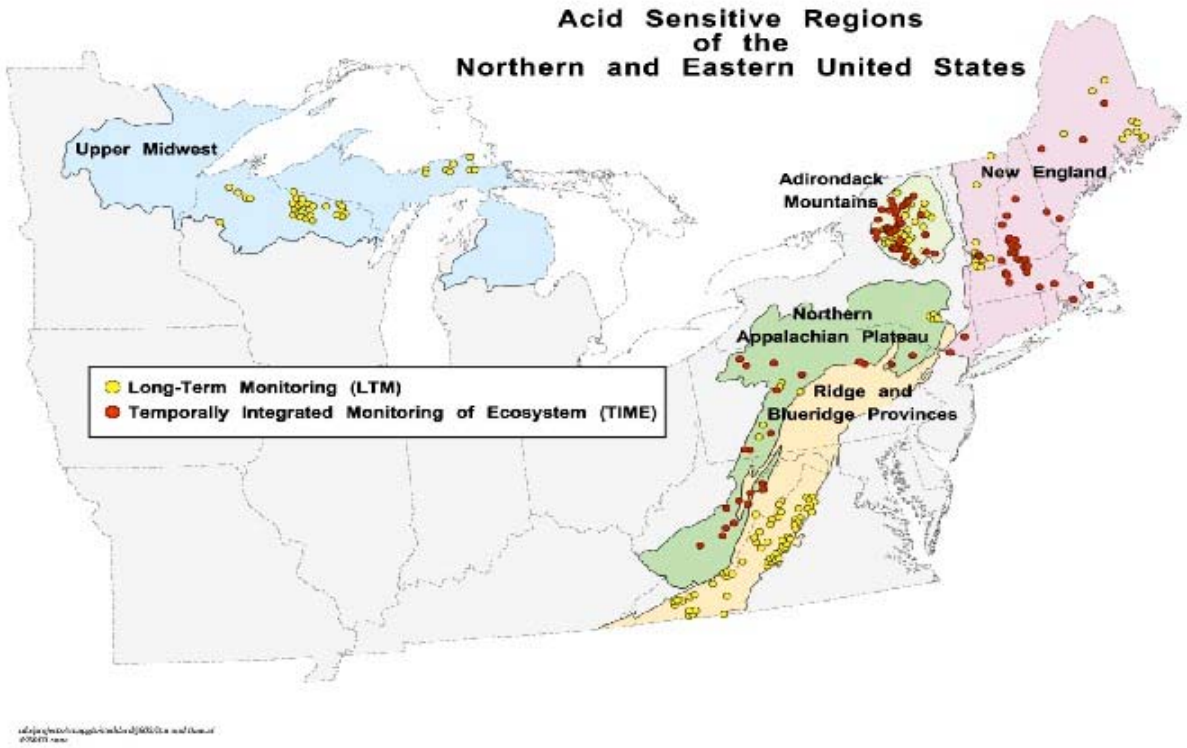
198

Changes in Species Richness For 35 Waters With Repeat Surveys

- Increased Richness 17
- No Change 14
- Decreased Richness 4



EPA LTM/TIME Surveys

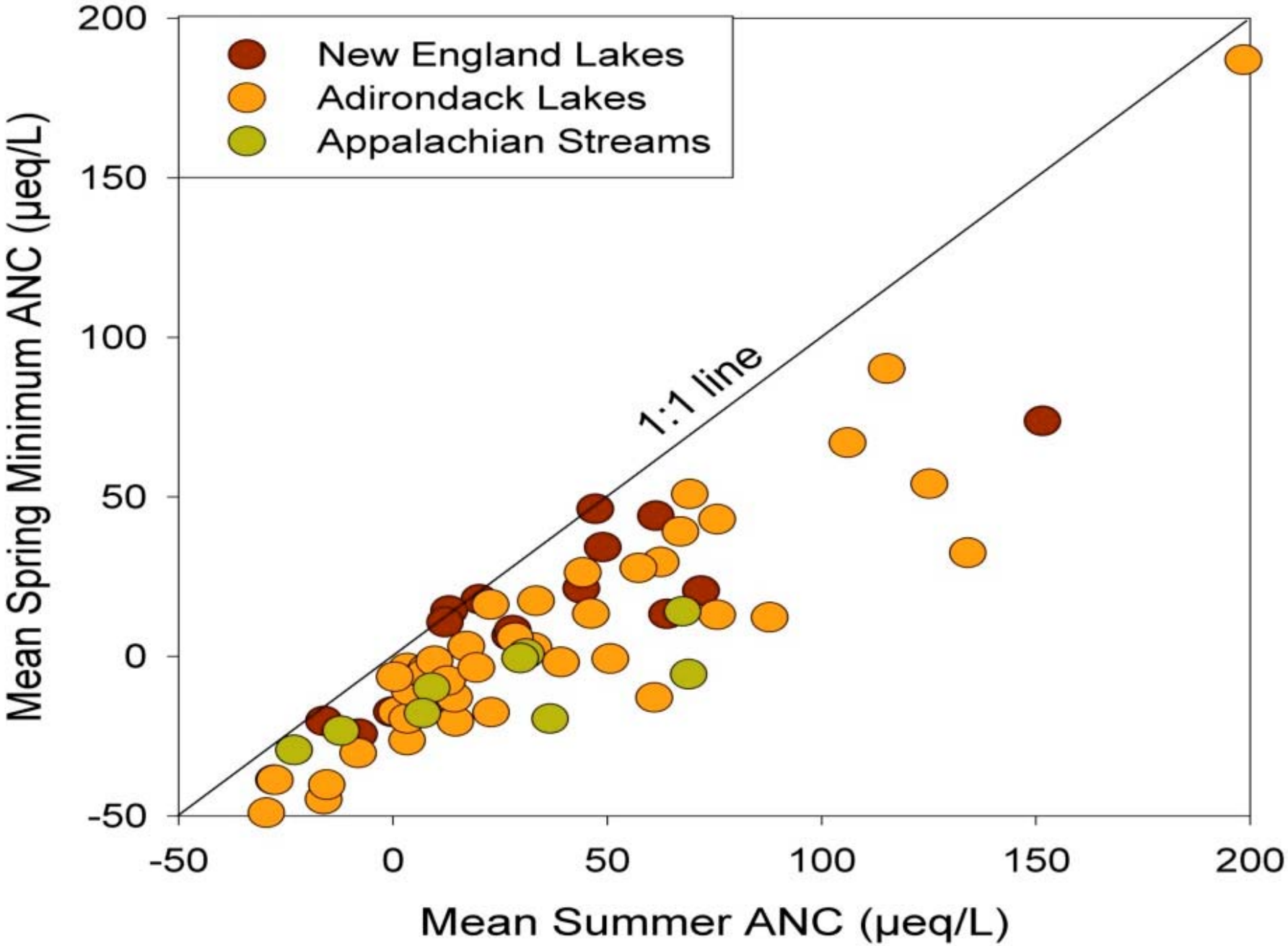


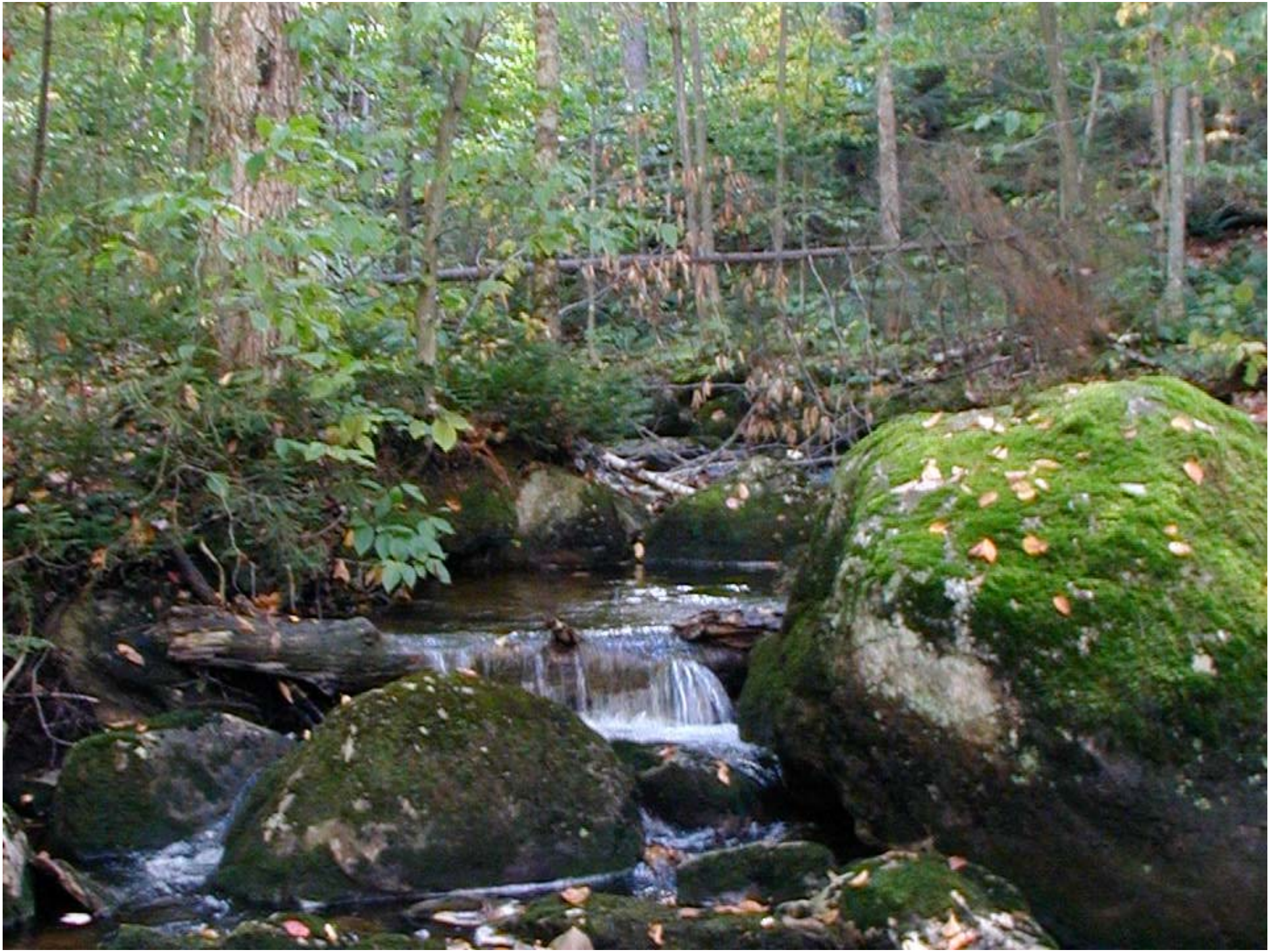
Press release:

Eight percent of lakes in the Adirondack are currently acidic, down from 13 percent in the early 1990s.

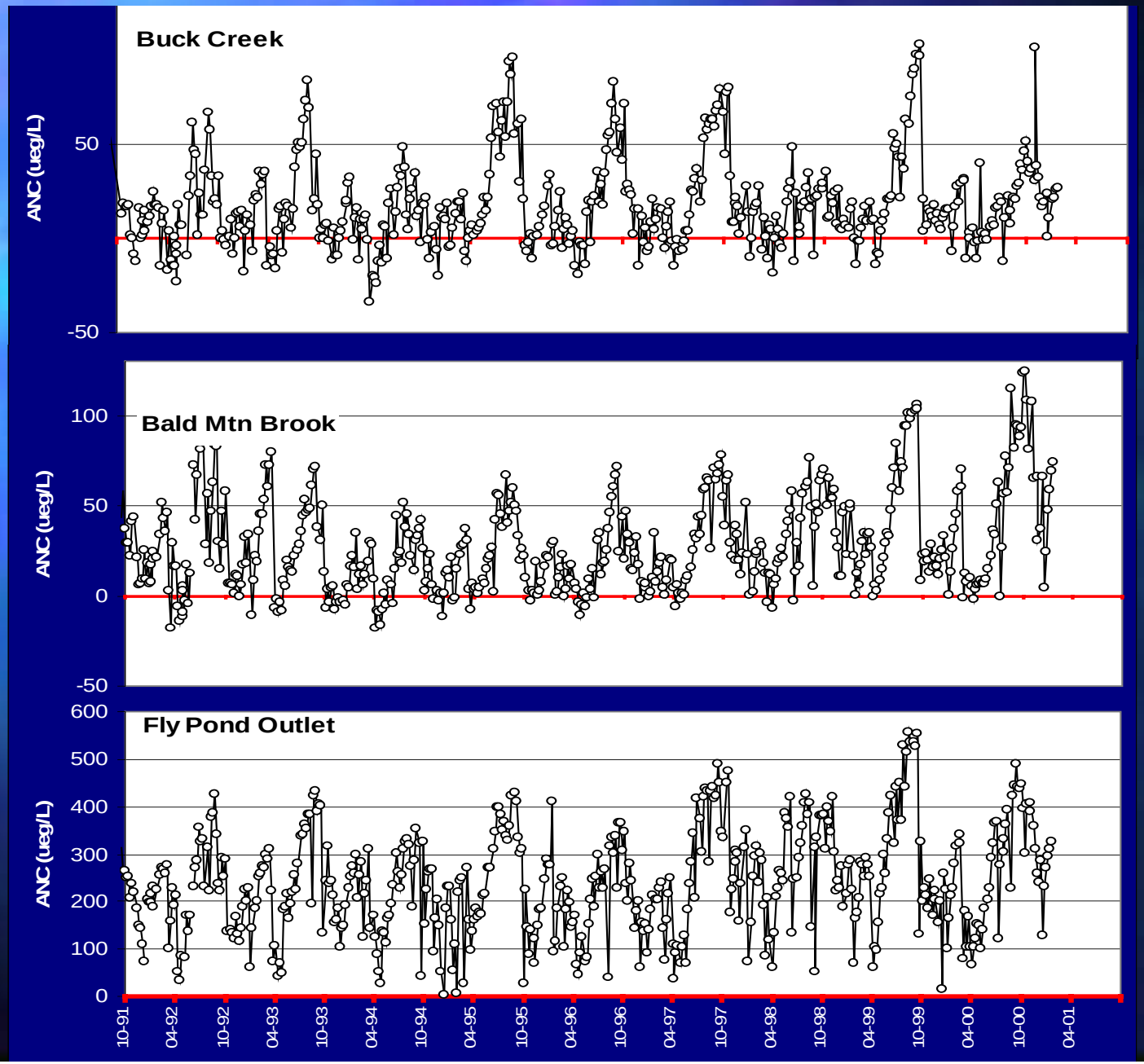
CONFUSION about terms and survey size

- ‘Acidic’ lake defined as ANC<0.
- Adirondack lake population defined as lakes with surface areas > 10 acres, or 1,290 lakes total.
- Sample sites = 43 lakes, summer.

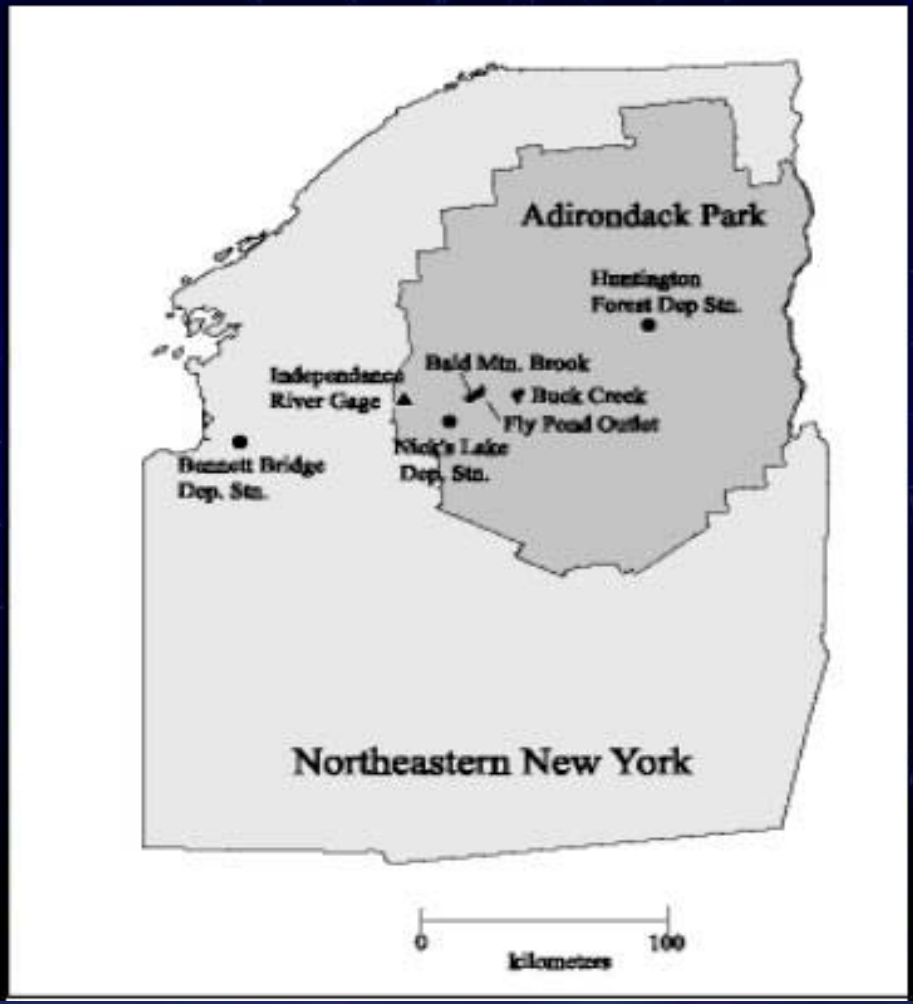

New England Lakes
Adirondack Lakes
Appalachian Streams
1:1 line
Mean Spring Minimum ANC (µeq/L)
Mean Summer ANC (µeq/L)
200
150
100
50
0
-50
-50
0
50
100
150
200



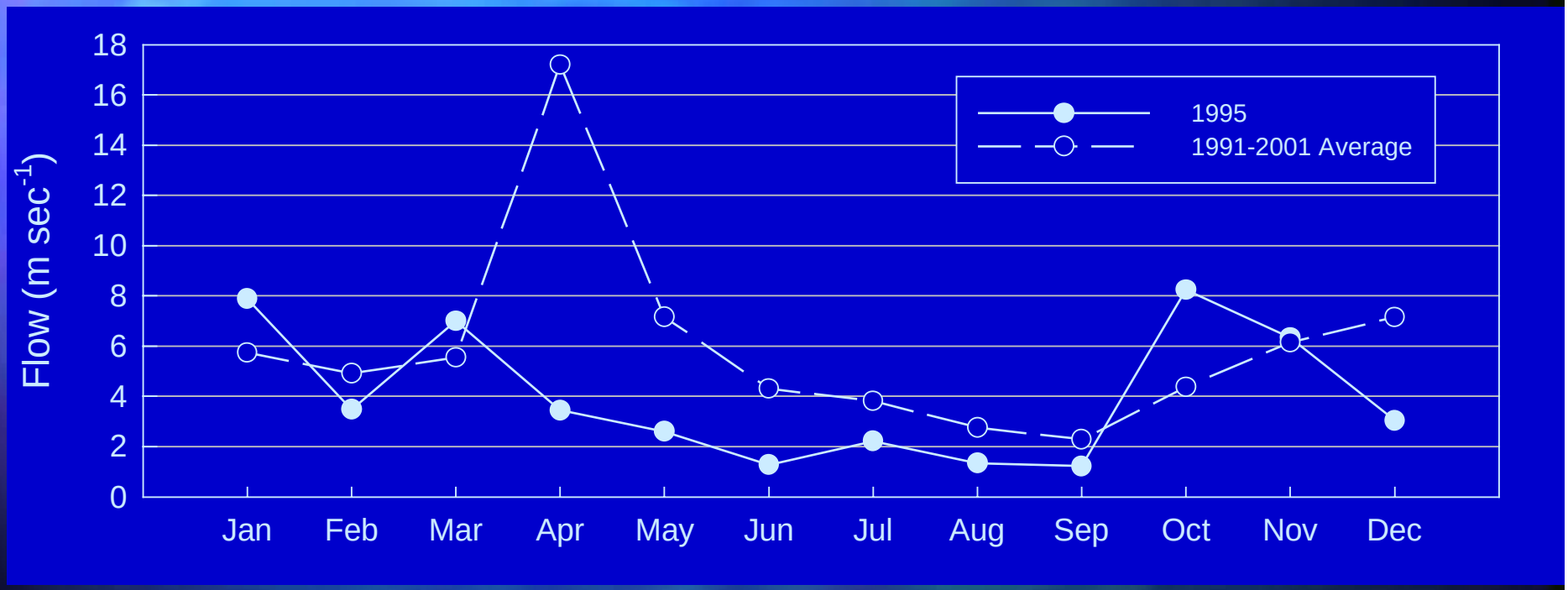
Streams 1991-2001 Acid Neutralizing Capacity

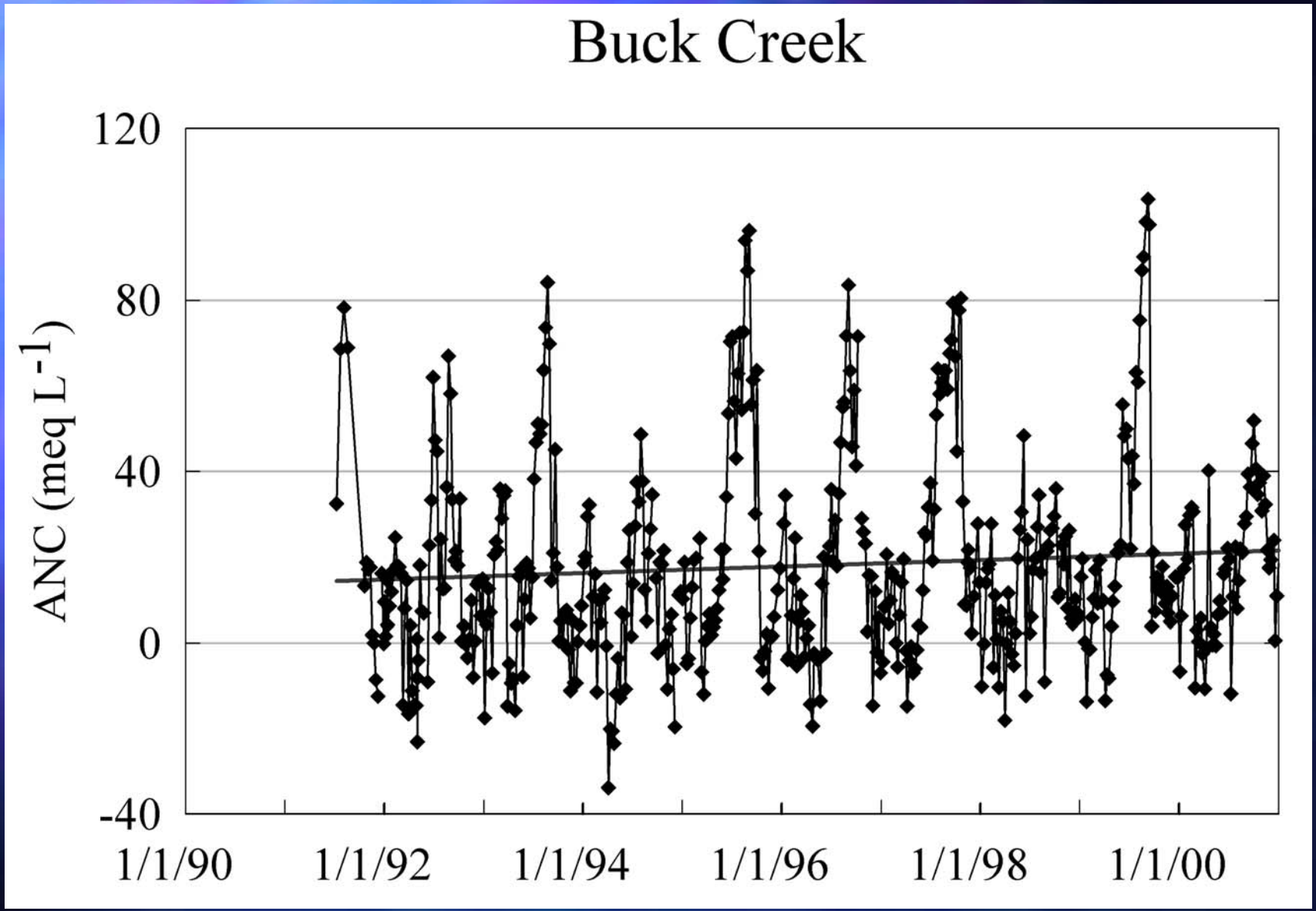


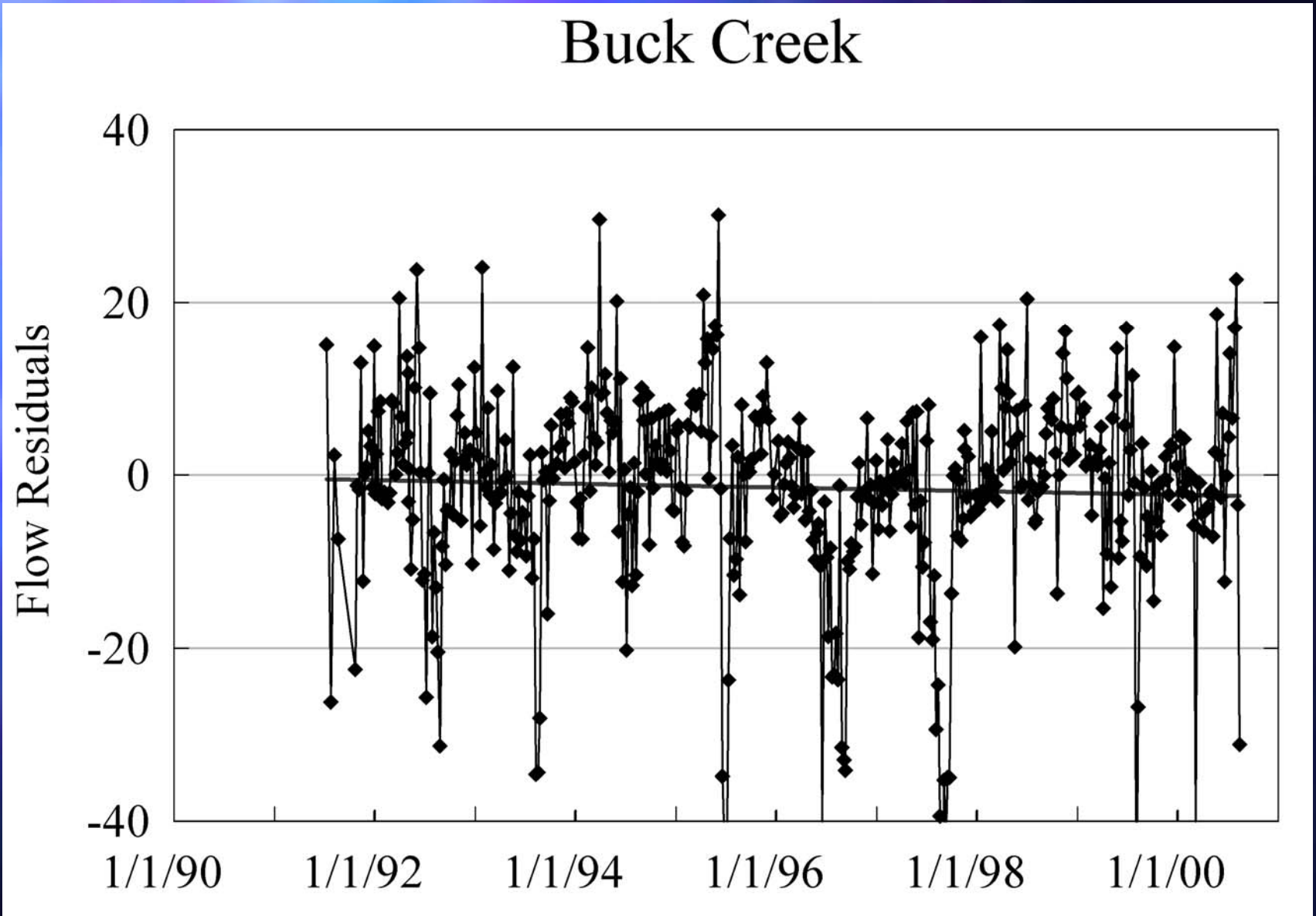
- Stream and Flow Gage Locations
- NADP Deposition Sites

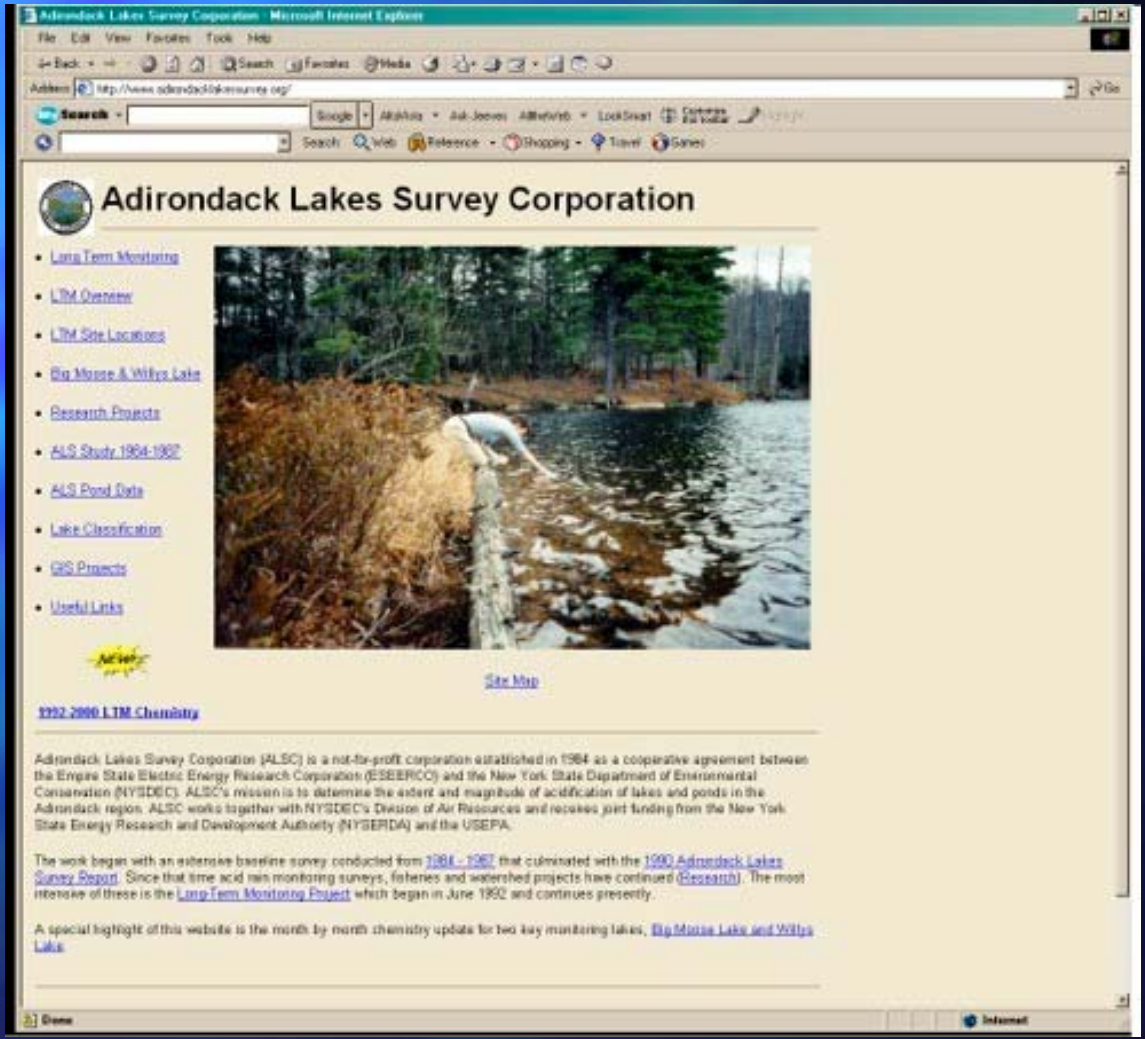


Independence River Flow 1991-2001




Buck Creek
120
80
40
0
-40
ANC (meq L-1)
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00


Buck Creek
Flow Residuals
40
20
0
-20
-40
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00

EPA Clean Air Markets Division

- ALSC website
- State of Science Report