ACID RAIN MONITORING IN THE ADIRONDACKS AND CATSKILLS

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OUTLINE

- DATA SOURCES
- SITE LOCATIONS
- SO_4, NO_3 AND pH Trends
- SUMMARY

WHY DOES DEC MONITOR ACID RAIN?

- STATE ACID DEPOSITION CONTROL ACT (SADCA) MANDATE
- INCREASED SPATIAL ACID RAIN MONITORING COVERAGE ACROSS THE STATE ESPECIALLY IN ECOLOGICALLY SENSITIVE REGIONS, SUCH AS THE ADIRONDACKS.
- MORE THAN HALF OF DEC ACID RAIN SITES MONITOR OTHER POLLUTANTS INCLUDING SO_2, O_3, $PM_{2.5}$ AND METEOROLOGICAL PARAMETERS.
- DEC MONITORS ARE LOCATED IN SUBURBAN, URBAN AND RURAL AREAS.

NEW YORK DATA SOURCES

- DEC - 20 SITES COLLECTING SINCE 1986 – SIX ARE IN THE ADIRONDACKS AND CATSKILLS.

  http://www.dec.state.ny.us/website/dar/baqs/acidrain/index.html

- NADP - 11 SITES COLLECTING SINCE 1978 – FOUR ARE IN THE ADIRONDACKS AND CATSKILLS.

  http://nadp.sws.uiuc.edu/sites/sitemap.asp?state=ny

MAP OF SITES

New York State
Acid Deposition
Monitoring Locations
Akwesasne Mohawk (NY22)
Paul Smith's College
Whiteface Base
Whiteface (NY98)
Huntington Wildlife
(NY20)
Wanakena
Moss Lake (NY29)
Nicks Lake
Altmar
Piseco Lake
Bennett Bridge
(NY52)
Niagara Falls
Rochester
East Syracuse
Buffalo
Aurora Rsrch Farm
(NY08)
Grafton Lake
Loudonville
Camp Georgetown
Westfield
Chautauqua
(NY10)
Alfred
(NY01)
Elmira
Belleayre Mt.
Biscuit Brook (NY68)
N
W
E
S
NYSDEC
NADP
Adirondack Park
Catskill Park
West Point
(NY99)
Mt. Ninham
Cedar Beach
Southold (NY96)
White Plains
N.Y. Botanical Gardens
Eisenhower Park
100
0
100 Miles

BELFORT RAIN GAUGE and VIKING HYETOMETER

WHITEFACE SULFATE

WHITEFACE NITRATE

WHITEFACE - pH

SULFATE

ADIRONDACKS SULFATE
y = -0.0465x + 94.346
R2 = 0.5117
M G /L wt
3
2.5
2
1.5
1
0.5
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
YR SO4
Linear (YR SO4)

CATSKILLS SULFATE
y = -0.057x + 115.4
R2 = 0.6512
M G /L wt
3
2.5
2
1.5
1
0.5
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
YR SO4
Linear (YR SO4)

NITRATE

ADIRONDACKS
y = -0.0118x + 24.842
R2 = 0.1037
2.5
2
1.5
1
0.5
0
MG/L wt
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
YR NO3
Linear (YR NO3)

CATSKILLS
y = -0.018x + 37.211
R2 = 0.2663
2
1.5
1
0.5
0
MG/L wt
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
YR NO3
Linear (YR NO3)

pH

ADIRONCACKS
y = 0.0119x - 19.243
R2 = 0.4393
YR pH
Linear (YR pH)
pH wt
4.8
4.7
4.6
4.5
4.4
4.3
4.2
4.1
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR

CATSKILLS
y = 0.0126x - 20.834
R2 = 0.5885
YR pH
Linear (YR pH)
pH wt
4.7
4.6
4.5
4.4
4.3
4.2
4.1
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR

ALL NYS SITES – SULFATE

SULFATE – ALL SITES

ALL NYS SITES – NITRATE

NITRATE – ALL SITES

Nitrate Ion Concentration, 1990

Nitrate Ion Concentration, 2004

ALL NYS SITES - pH

pH – ALL SITES

Hydrogen Ion Concentration as pH, 1990
pH
>5.3
5.2 - 5.3
5.1 - 5.2
5.0 - 5.1
4.9 - 5.0
4.8 - 4.9
4.7 - 4.8
4.6 - 4.7
4.5 - 4.6
4.4 - 4.5
4.3 - 4.4
<4.3
4.24
4.17
4.34
4.45
4.36
4.41
4.25
4.26
4.18
4.16
4.19
4.16
4.19
4.21
4.37
4.25
4.32
4.39
4.29
4.29
4.26
4.17

Hydrogen Ion Concentration as pH, 2004
pH
> 5.3
5.2 - 5.3
5.1 - 5.2
5.0 - 5.1
4.9 - 5.0
4.8 - 4.9
4.7 - 4.8
4.6 - 4.7
4.5 - 4.6
4.4 - 4.5
4.3 - 4.4
< 4.3
4.57
4.59
4.57
4.52
4.62
4.68
4.45
4.32
4.60
4.58
4.63
4.67
4.56
4.46
4.58
4.44
4.61
4.62
4.51
4.46
4.48
4.51
4.47
4.38
4.52
4.48
4.47
4.51

SUMMARY

- SO_4 CONCENTRATIONS HAVE DECREASED SUBSTANTIALLY DURING PAST 20 YEARS.
- NO_3 CONCENTRATIONS HAVE DECREASED.
- pH HAS SHOWN SUBSTANTIAL IMPROVEMENT.
- THE DEPARTMENT PLANS TO CONTINUE THIS MONITORING PROGRAM.

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