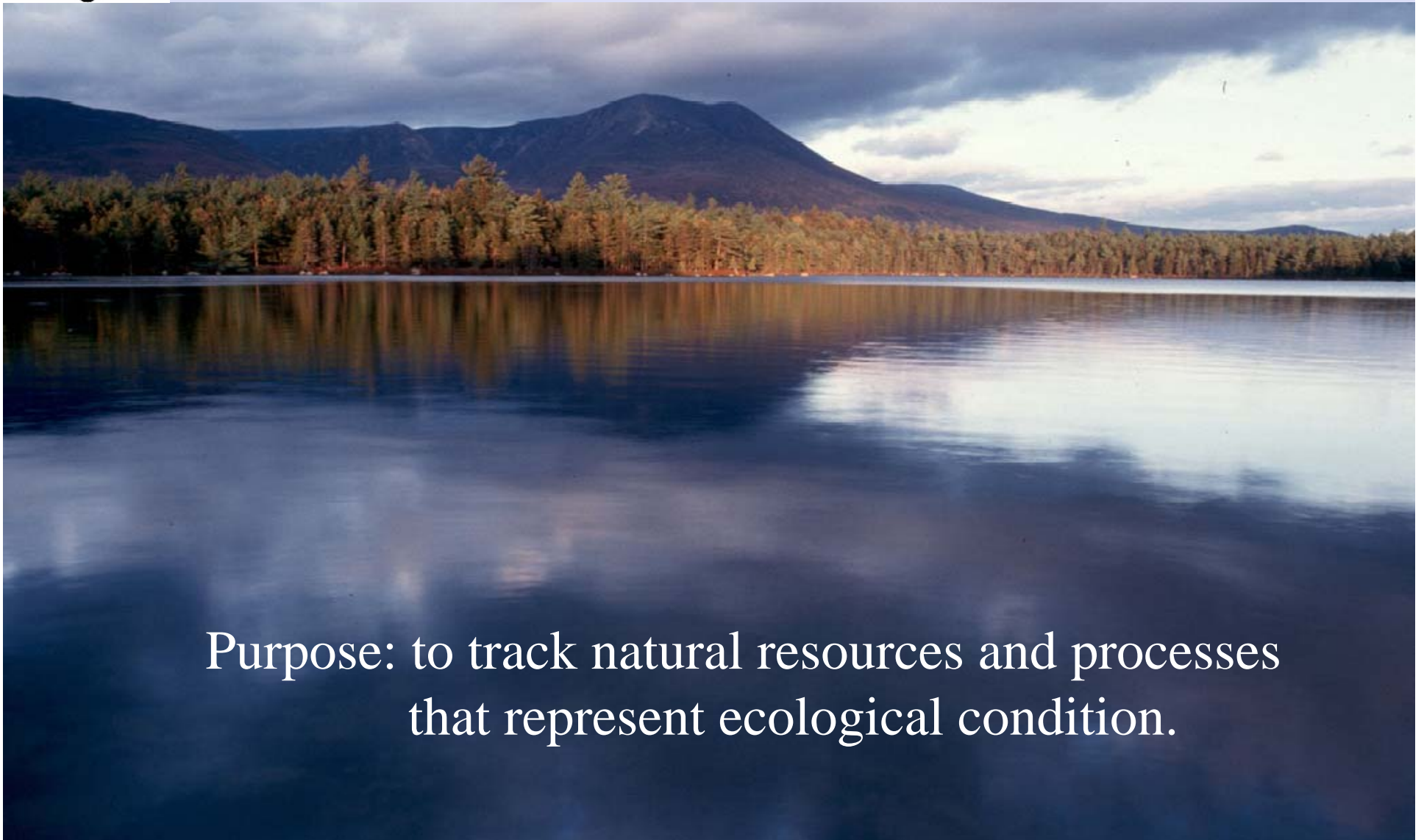


Appalachian Trail MEGA-Transect Deposition Effects Proposed Study





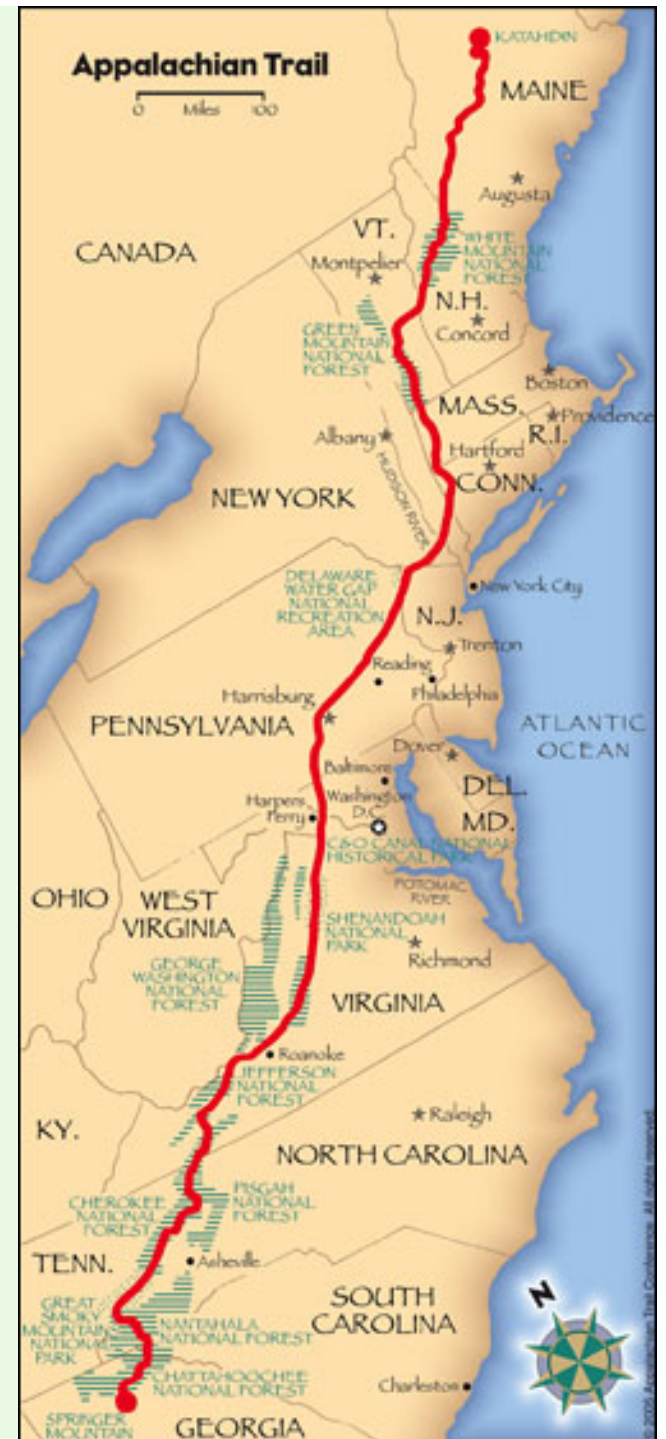
Appalachian Trail Vital Signs Monitoring Program



Purpose: to track natural resources and processes that represent ecological condition.

Appalachian Trail MEGA-Transect as a Monitoring Tool

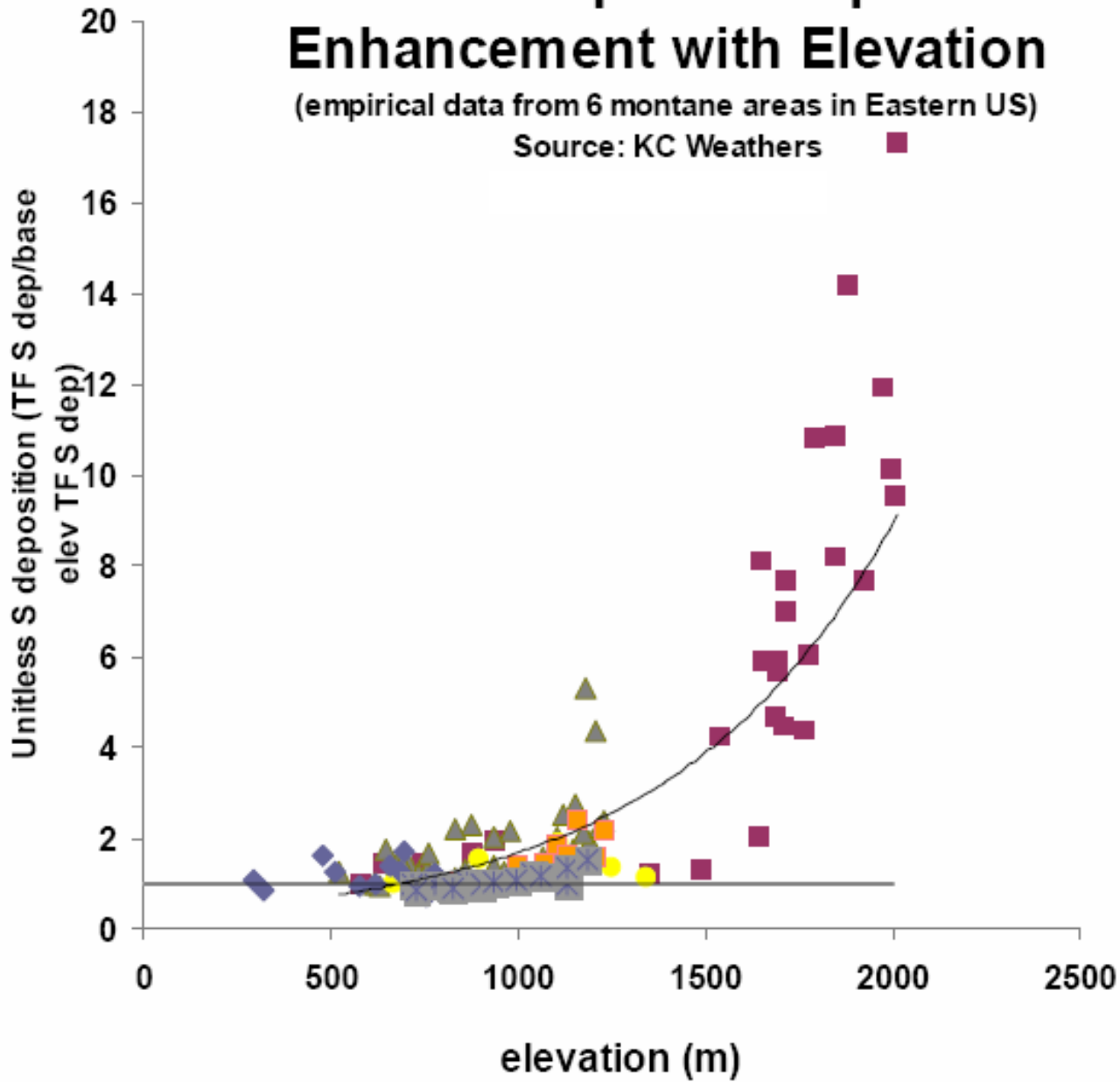
1. Spans over 2000 miles north to south.
2. Includes a wide range of climatic and elevational gradients.
3. Represents a wide array of ecological diversity.
4. It travels along ridgetops—highly sensitive ecosystems that contain many rare species.



Total Atmospheric Deposition Enhancement with Elevation

(empirical data from 6 montane areas in Eastern US)

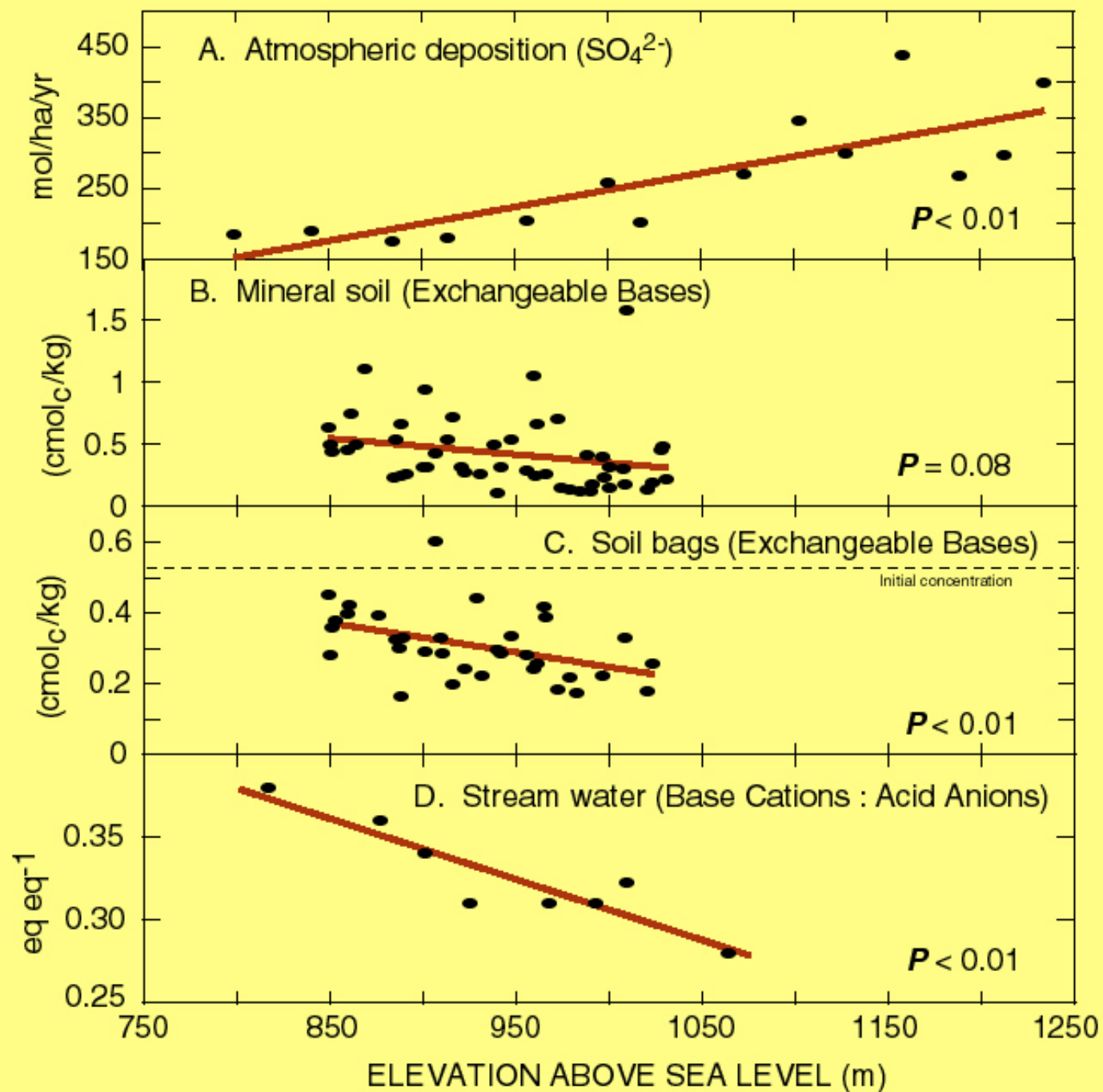
Source: KC Weathers

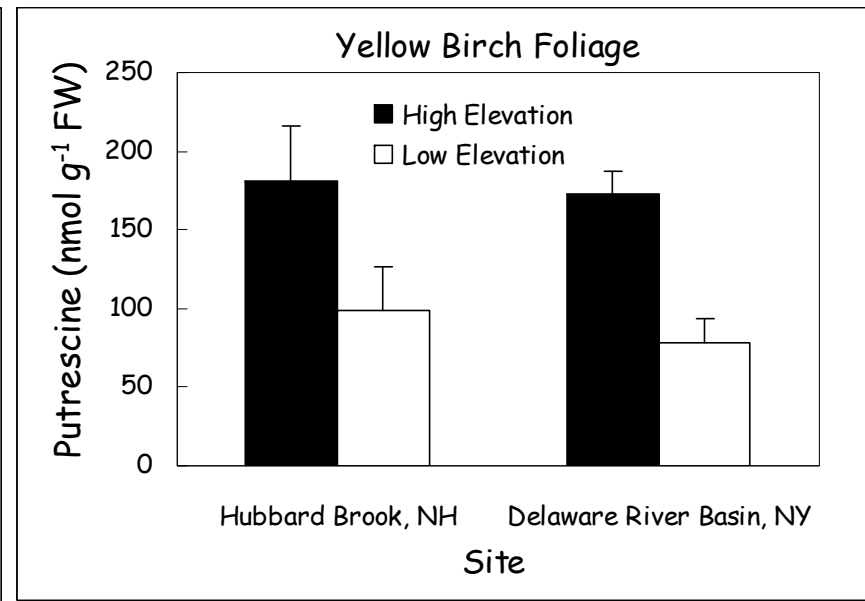
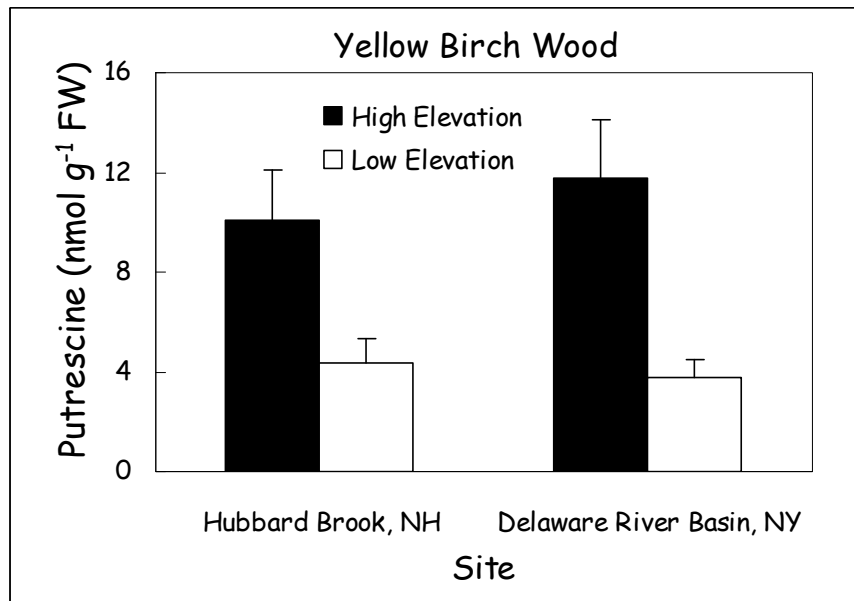
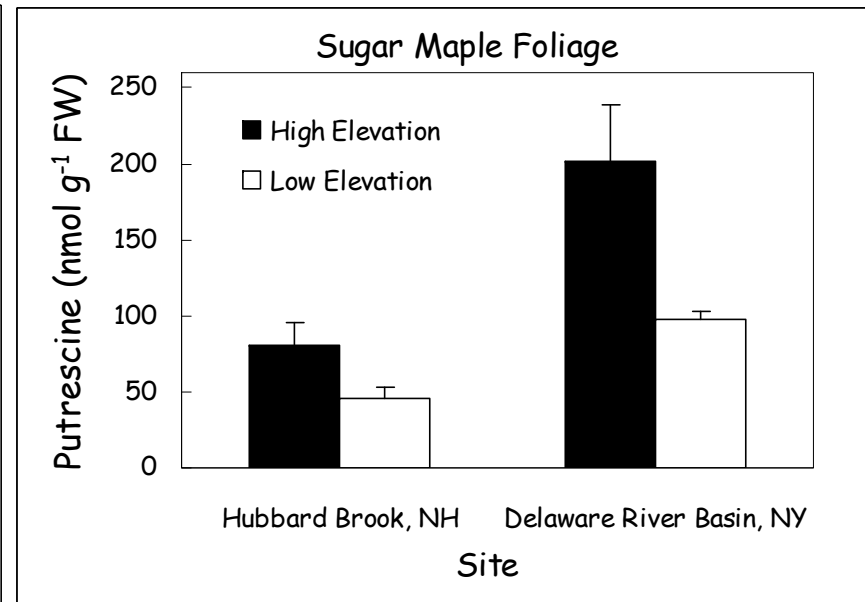
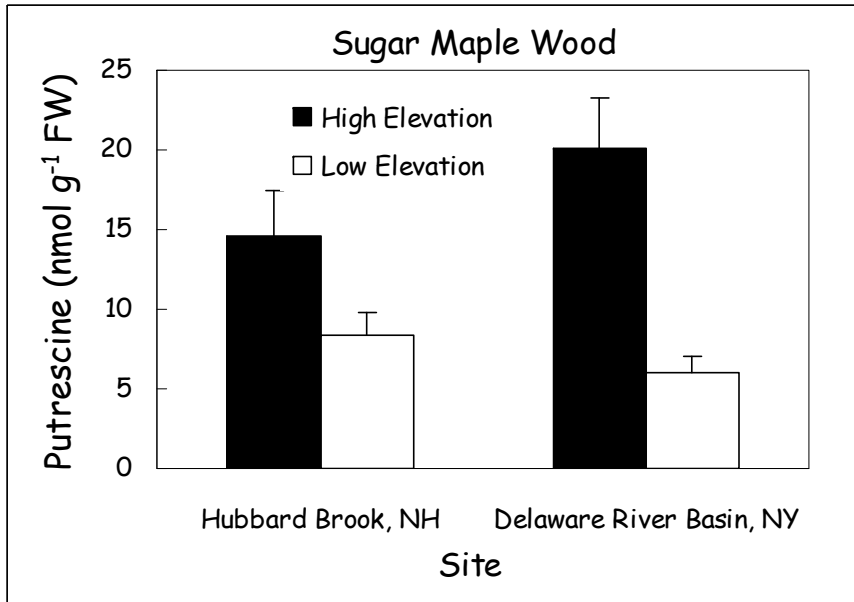




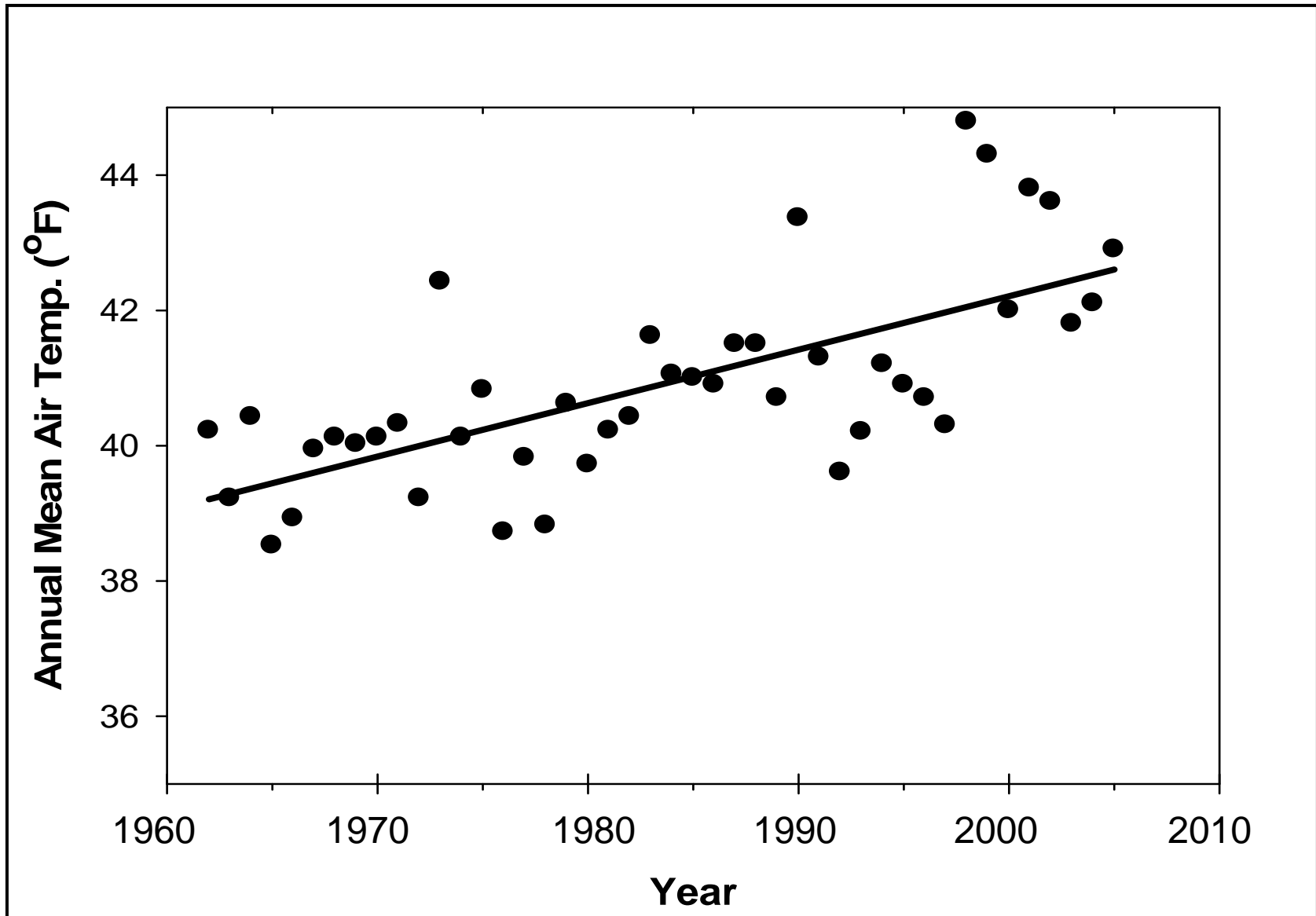
Elevational gradients:

*Slide Mountain,
Catskill Region,
NY*





Slide Mountain, Catskill Mountains, NY



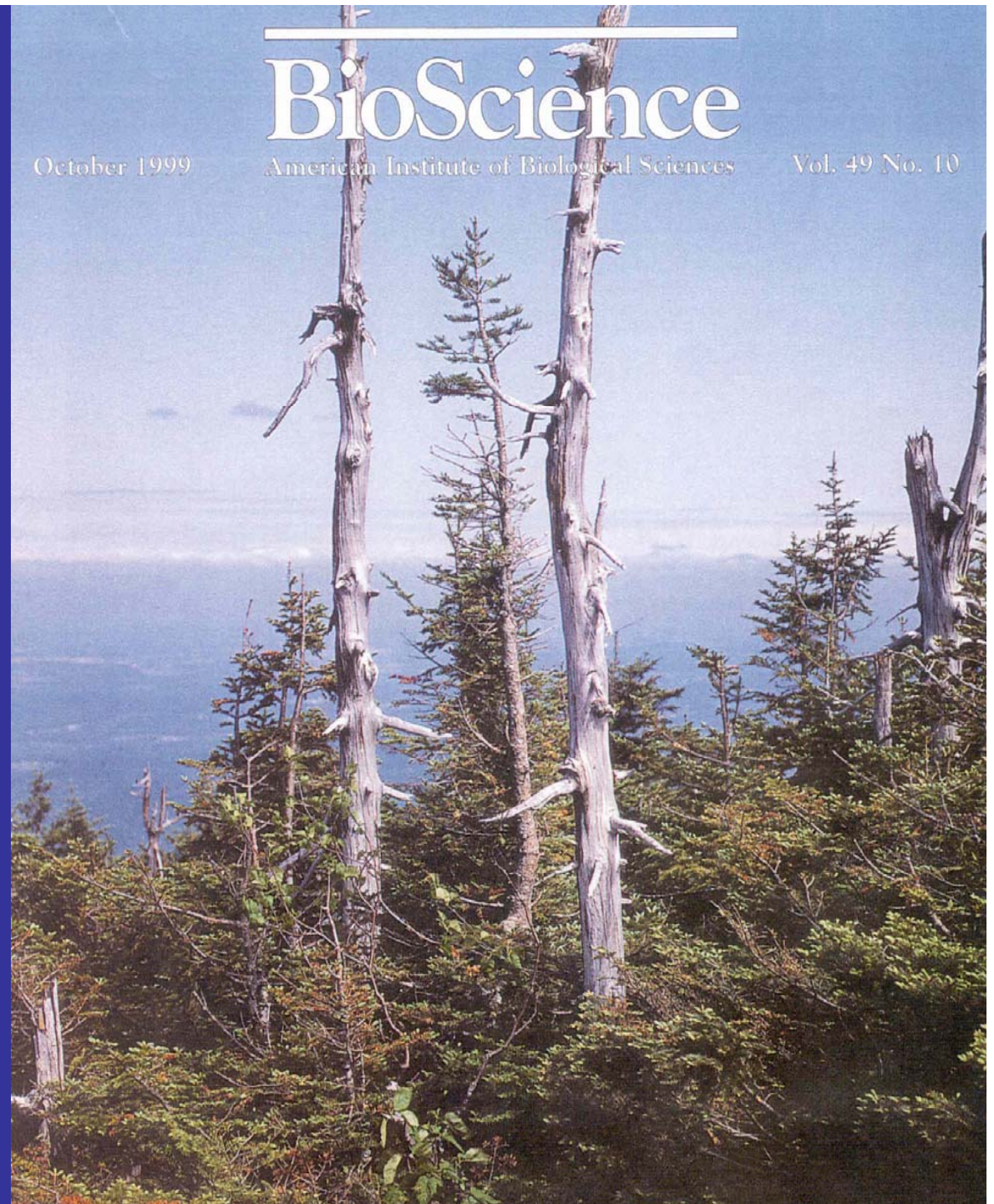
Why the AT is ideal for environmental monitoring

1. Natural ecosystem sensitivity due to climatic extremes, short growing seasons and limited soil development (shallow, highly leached).
2. Tend to receive highest atmospheric deposition of pollutants.
3. May see the highest rates of climate change.

**High Elevation
Mortality Estimates
1970-1990**

Adirondack/Green
Mountains > 50%

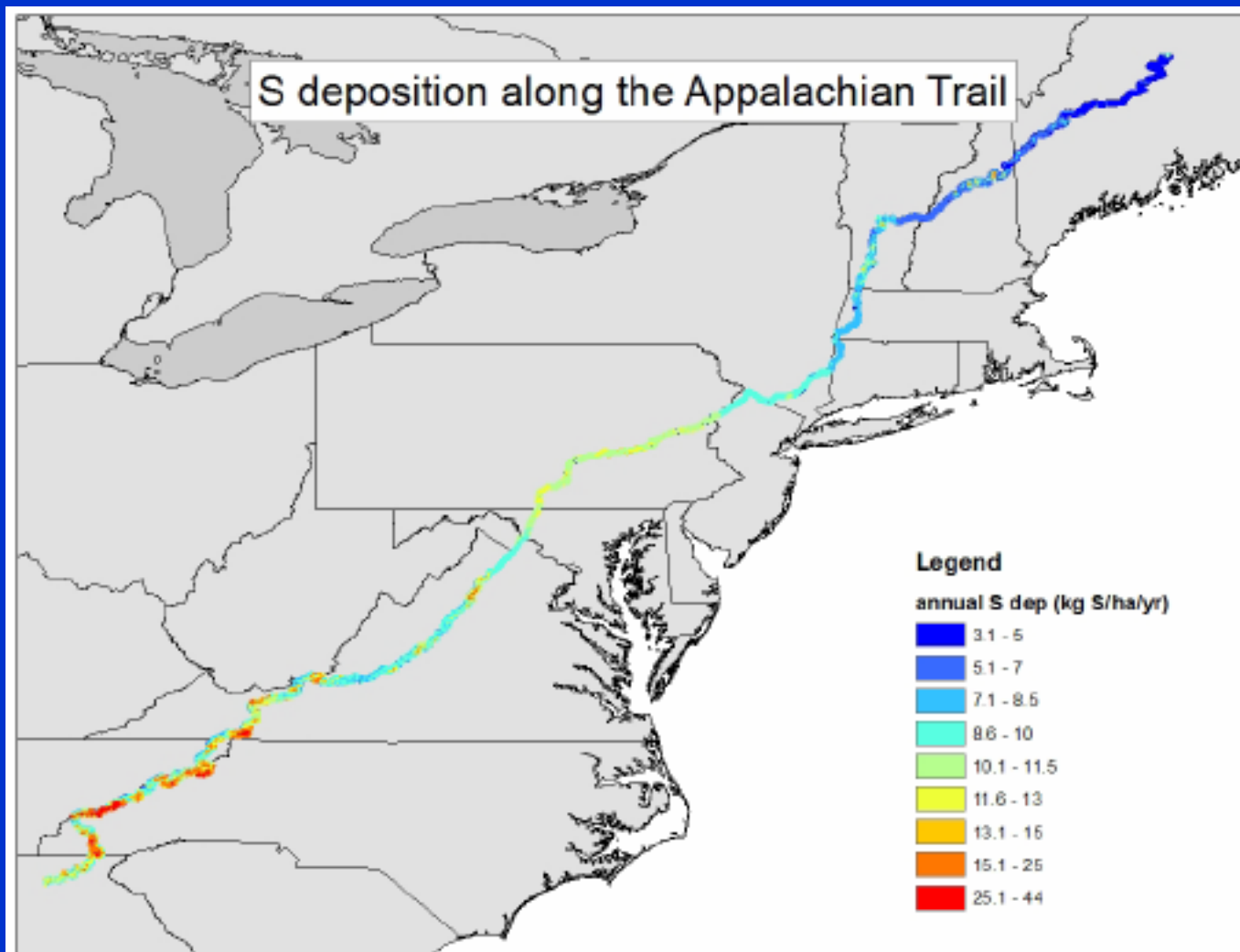
White Mountains
25%



Freezing Injury of Red
Spruce Needles, 2003,
Near Old Forge, NY

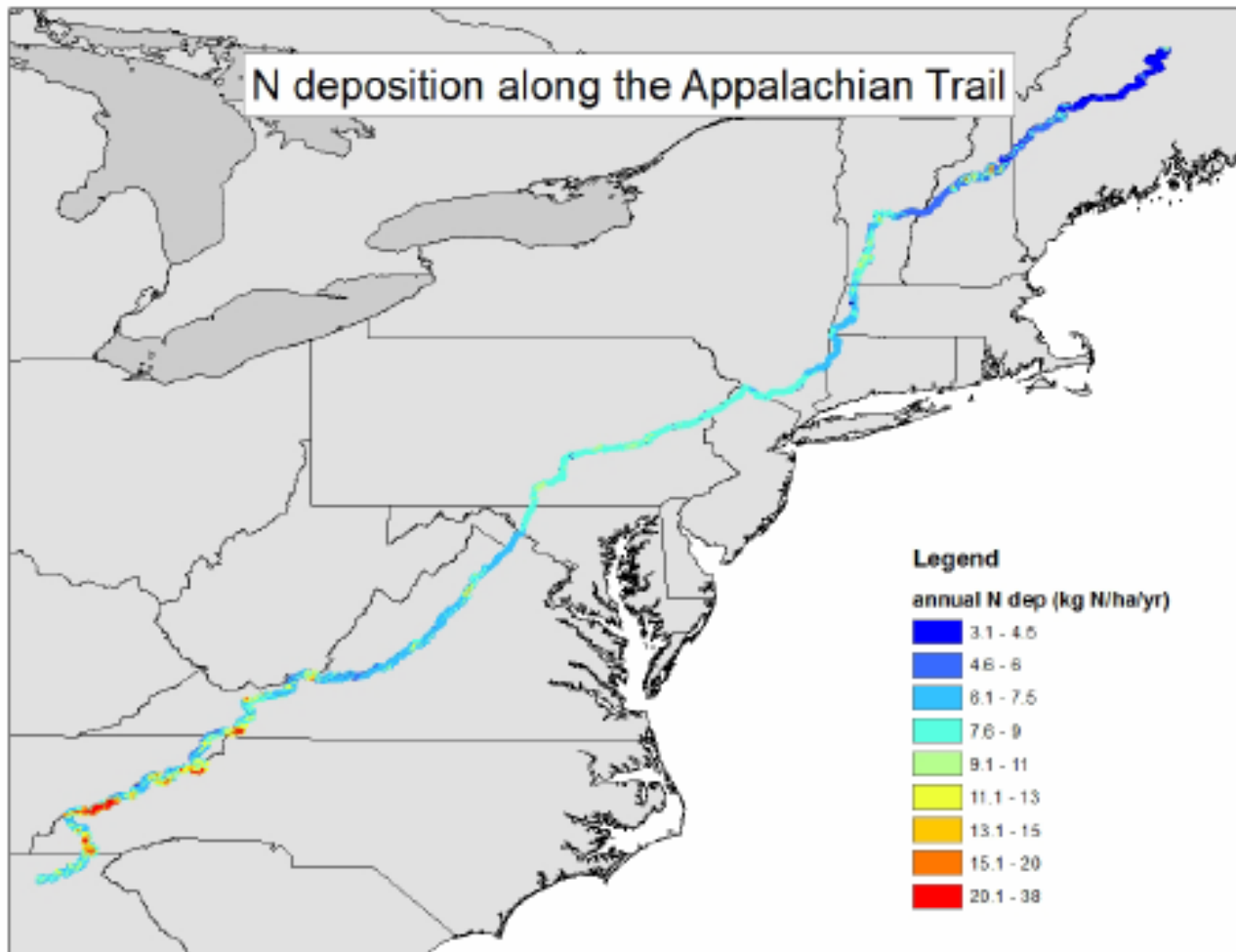


LandMod Deposition Model Results



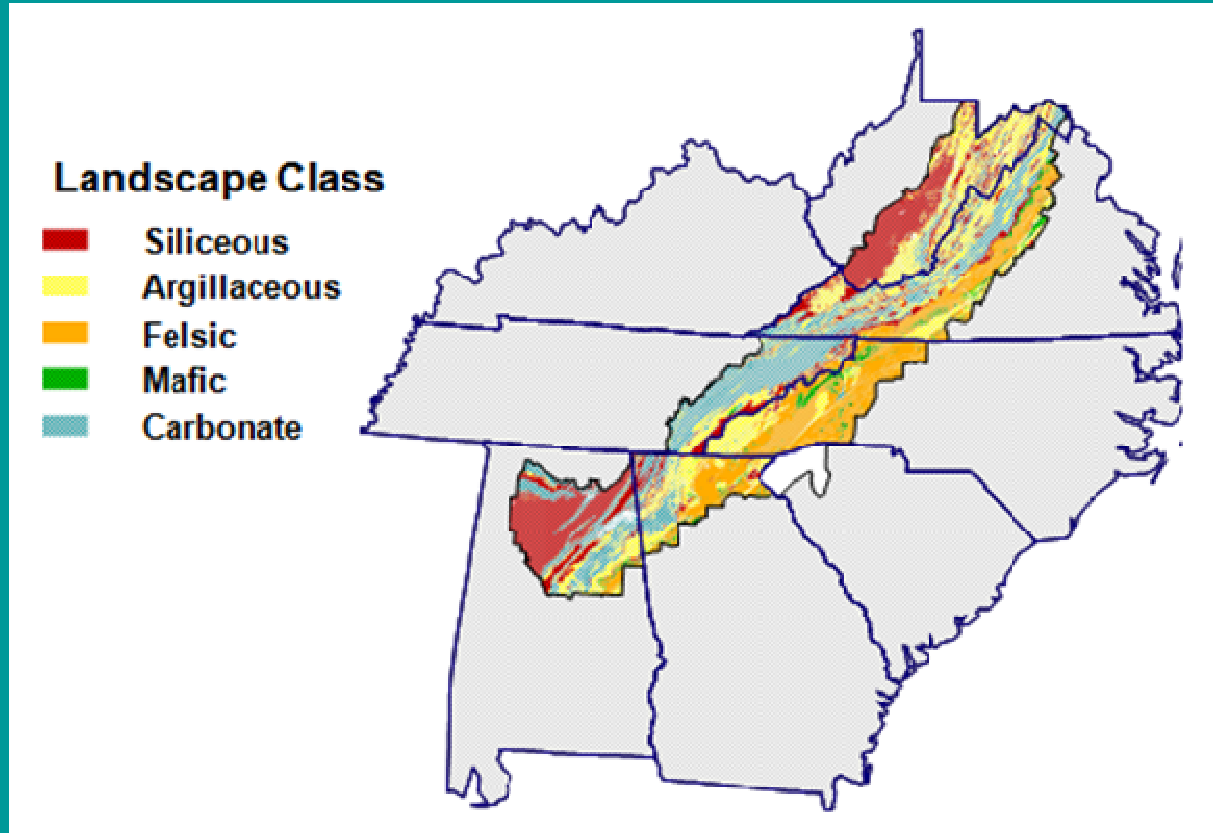
Source: K.C. Weathers et al. DRAFT Total sulfur deposition
DO NOT CIRCULATE

LandMod Deposition Model Results



Source: K.C. Weathers et al. DRAFT Total inorganic nitrogen deposition
DO NOT CIRCULATE

SAMI Sensitivity Classes



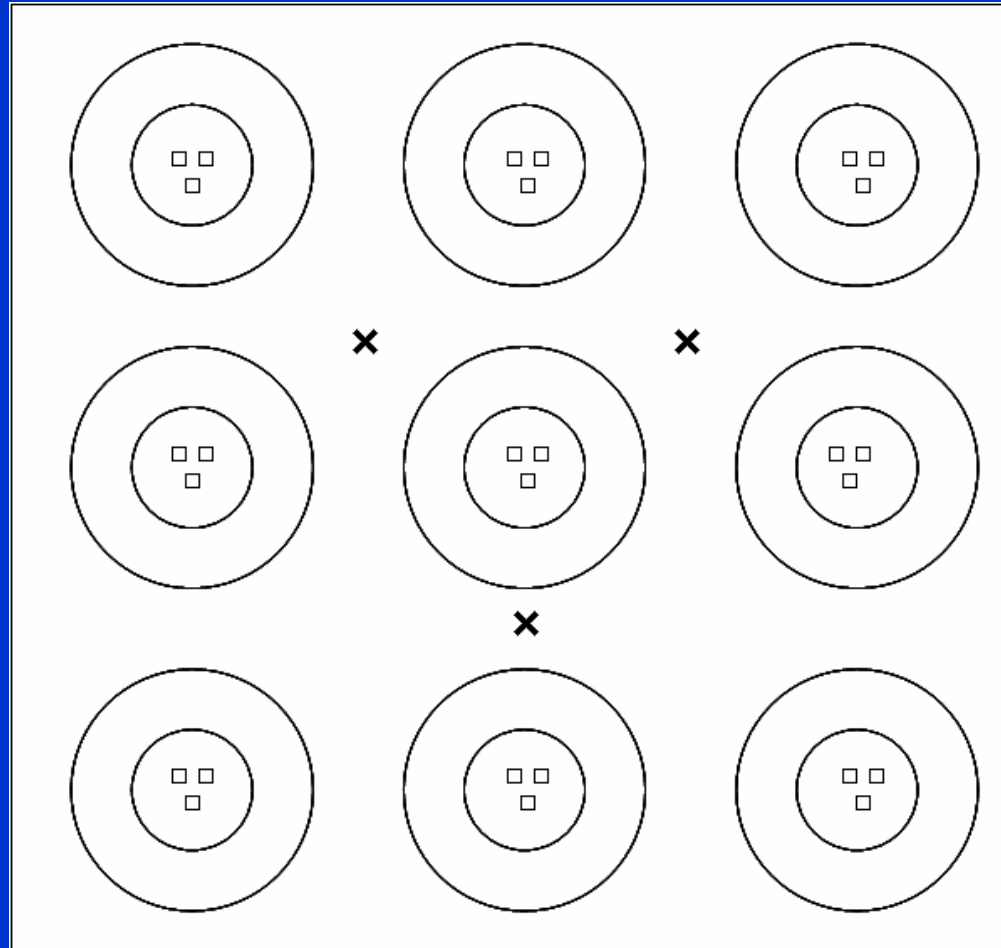
3-Tiered Sampling Design

- **Level 1:** intensive sampling at 12 sites.
- **Level 2:** soil and surface water sampling at 50 sites.
- **Level 3:** surface water sampling at 200 sites.

Level 1 Sampling

- Atmospheric Deposition monitoring (4 sites)
- Full soil profile sampling
- Soil core sampling
- Wood plugs for biochemical analysis
- Tree cores for dendrochronology
- Overstory and understory measurements
- Surface water samples

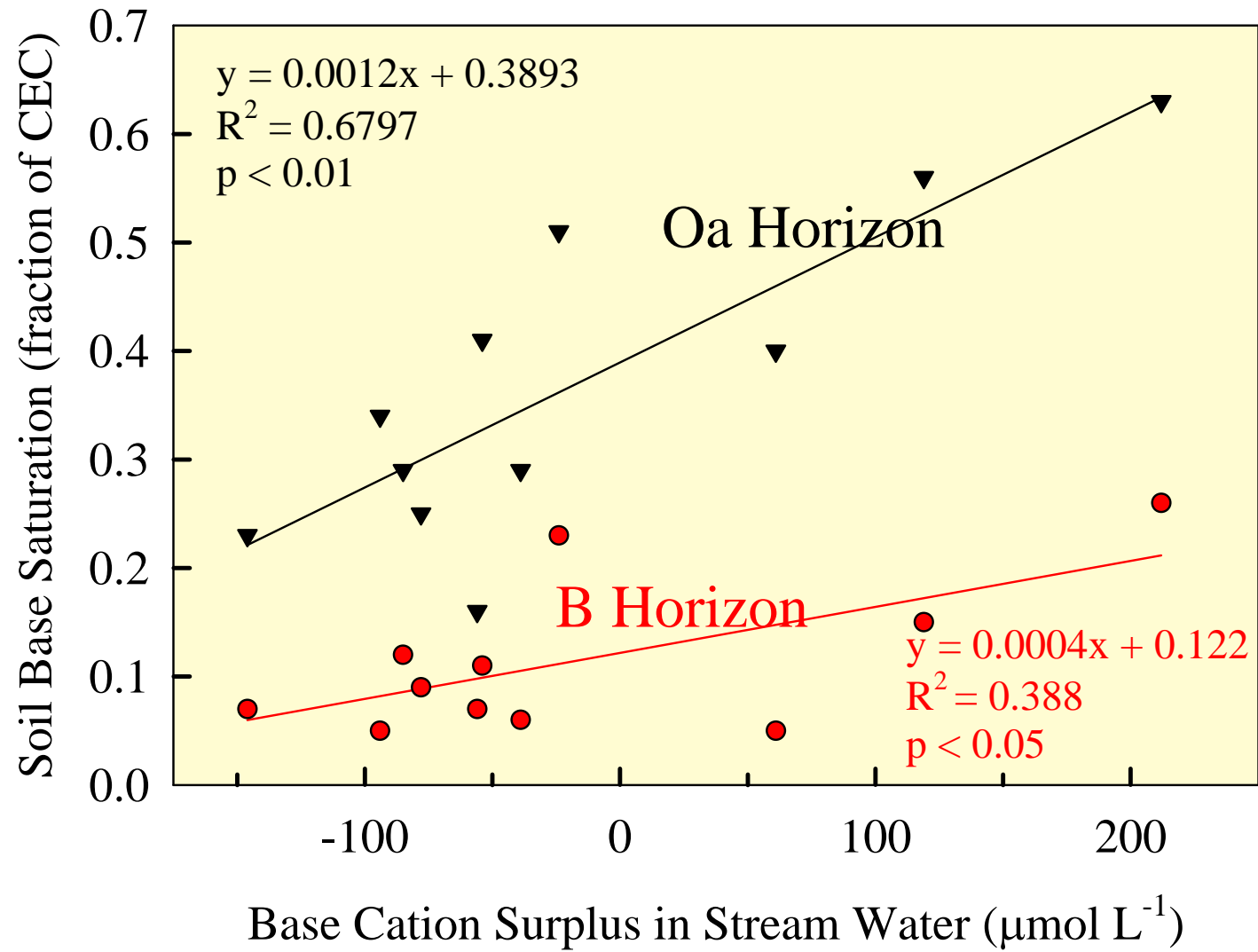
Level 1 Plot Design



Critical Loads-Linking Deposition to Ecosystems

- Spatial extrapolation of current best-estimates
- Temporal extrapolation for Level 1 and Level 2 sites.
- Evaluation of ecological indicators.

Soil Stream - Water Relations



Temporal Modeling of Soil Exchange Chemistry

Crawford Notch--Soil pH (CaCl₂ extraction)

| | <u>1992-93</u> | <u>2003</u> |
|-----------------|----------------|-------------|
| Oa Horizon | 2.60 | 2.98* |
| Upper B Horizon | 3.91 | 3.83 |

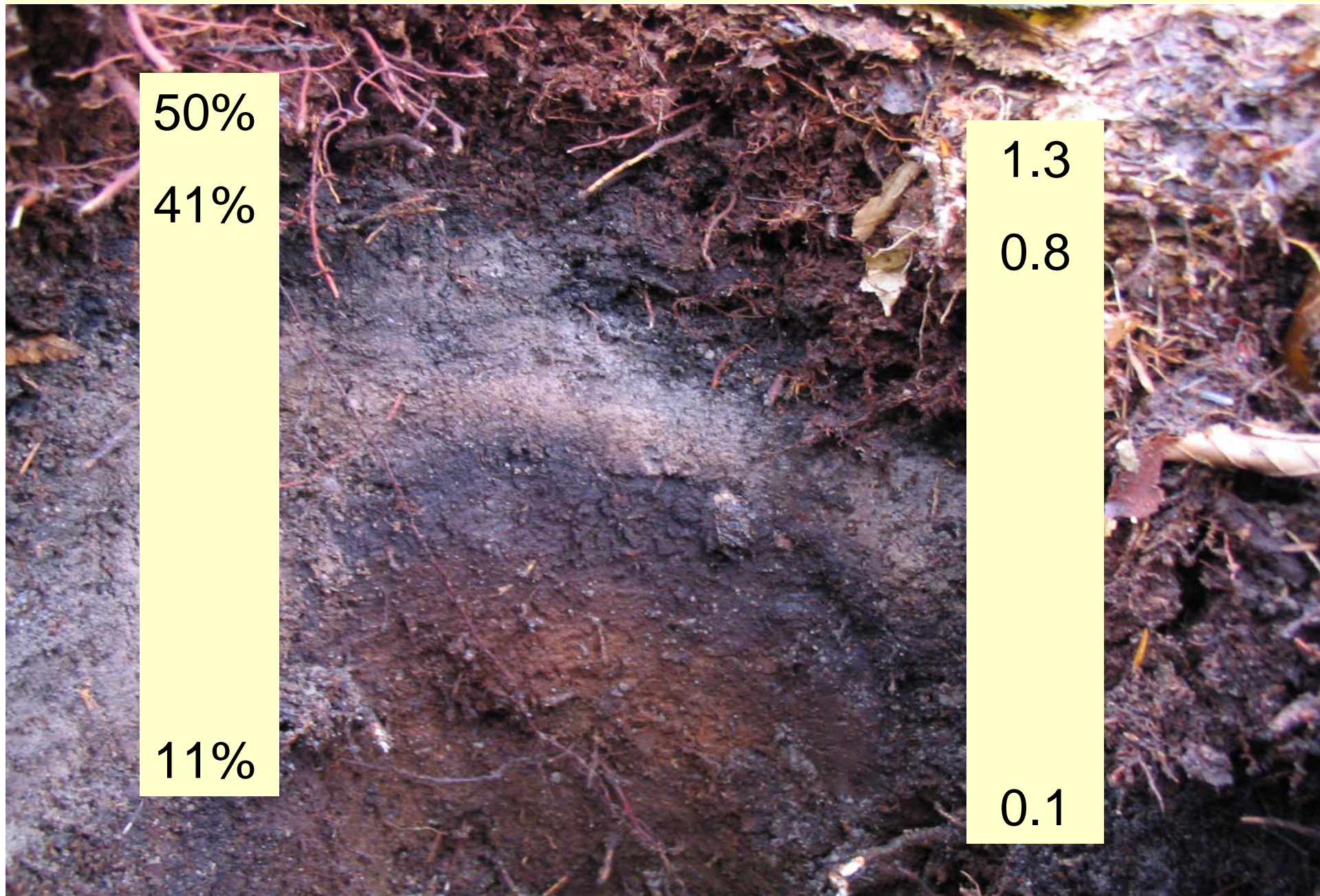
Soil pH

| Horizon | North Tributary | South Tributary |
|---------|-----------------|-----------------|
| Oa | 3.11 | 4.00 |
| Upper B | 3.52 | 4.75 |

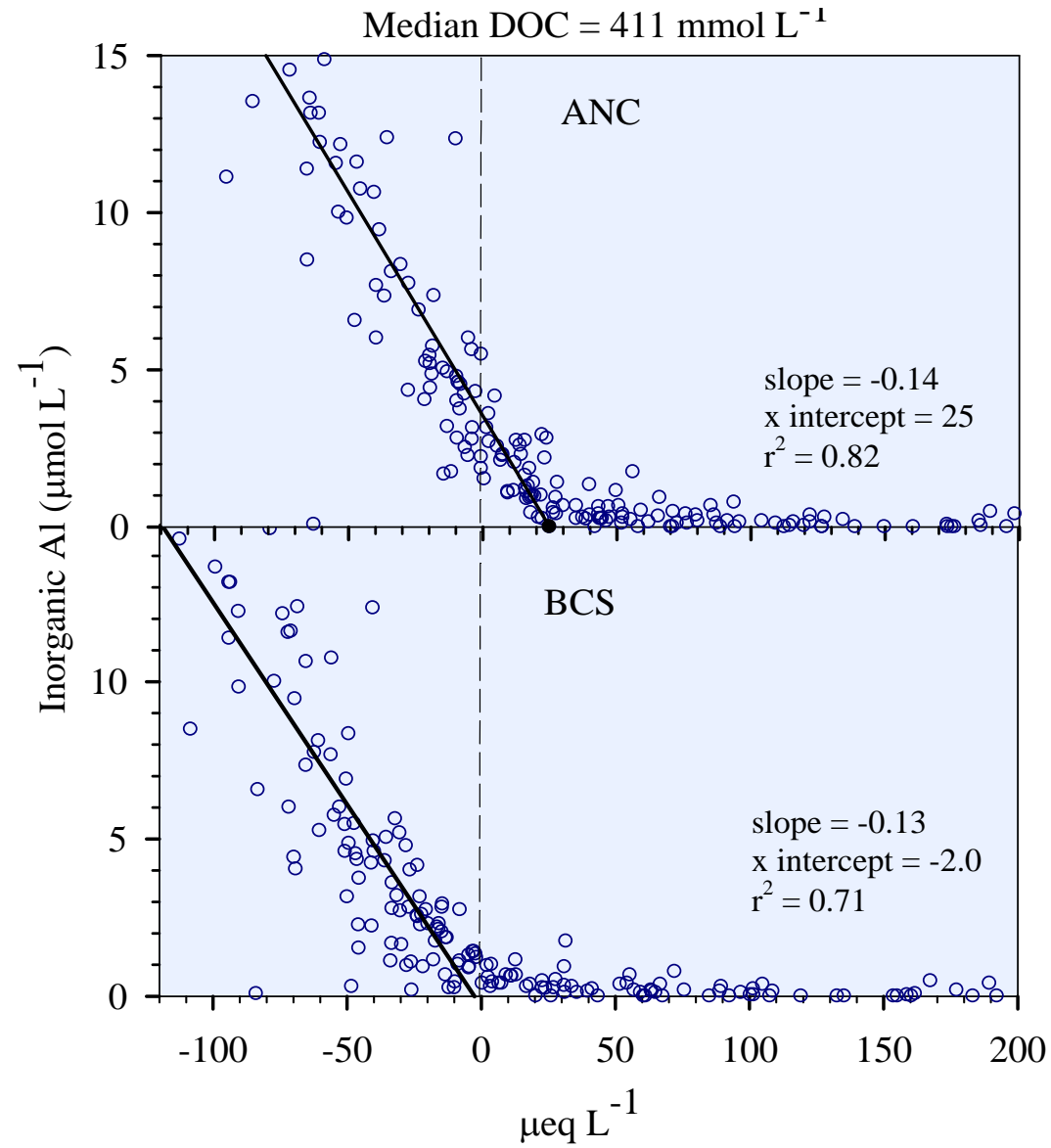


Base Saturation

Ca:Al



Base Cation Surplus



Technology Transfer

- final agency summary report
- a fact sheet of project highlights
- manuscripts for the peer-reviewed literature
- GIS coverages
- presentations at professional meetings
- Archived soils for future analysis
- Soils data available on public webpage