

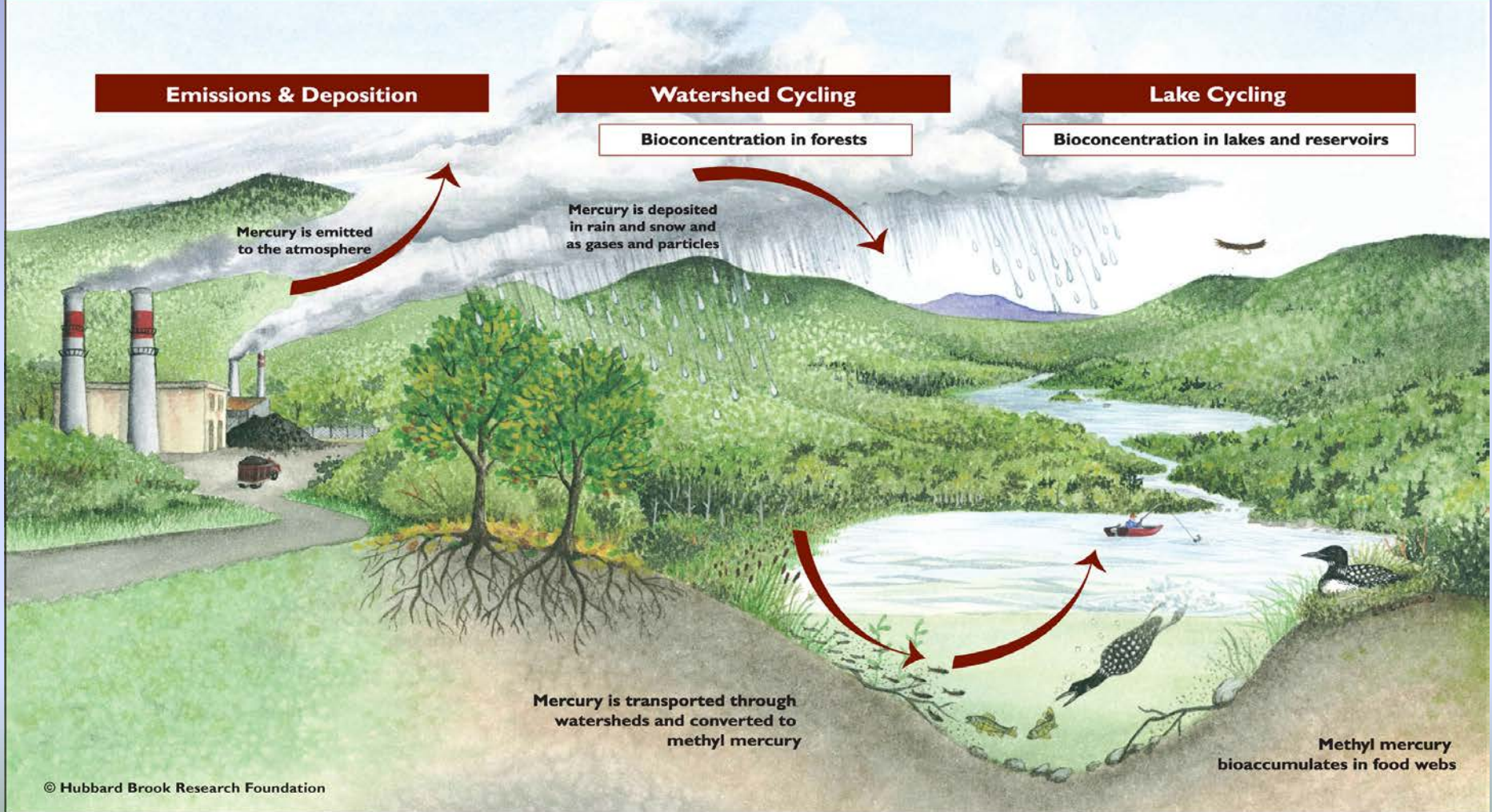
Deposition and Fate of Mercury in Forests of the Adirondacks

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Syracuse University



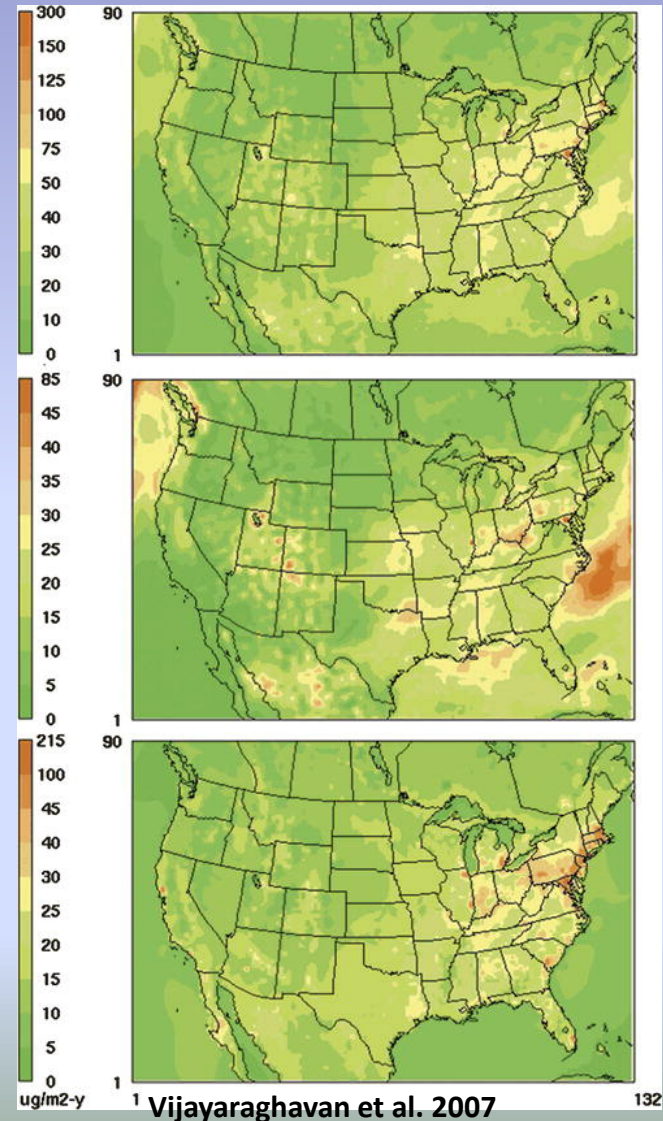
Mercury Cycle

Quicksilver Clouds: How Mercury Enters, Cycles, and Impacts Ecosystems



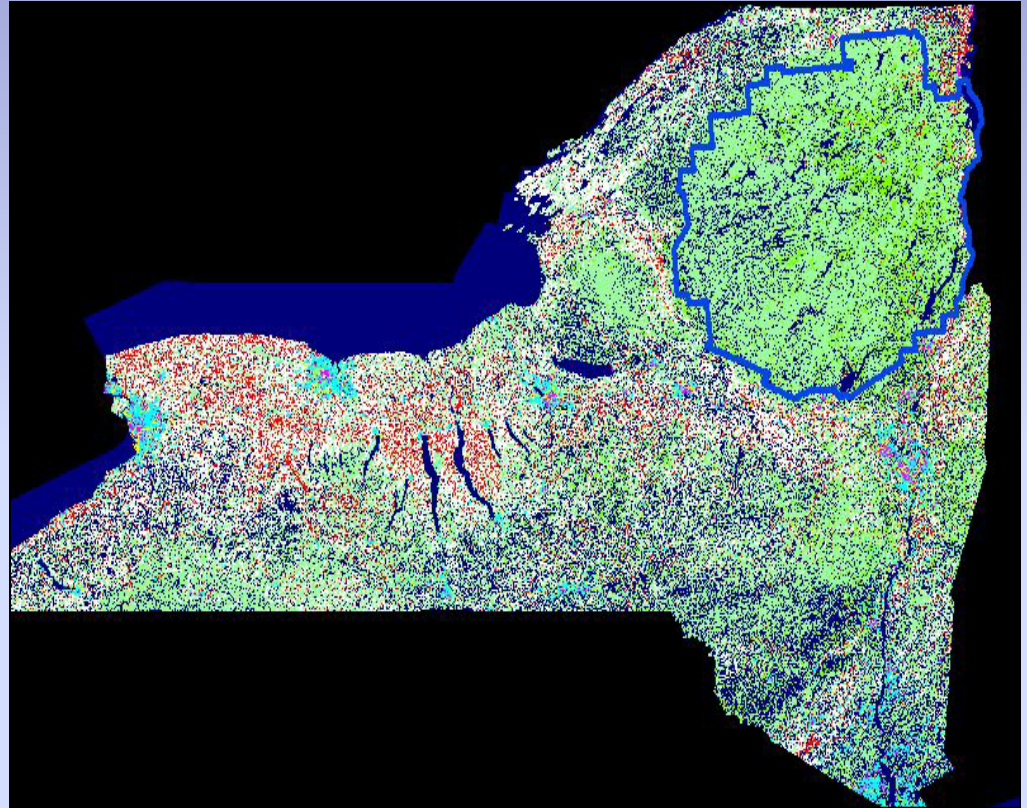
Deposition

- Wet deposition occurs through precipitation
- Throughfall enrichment
- Dry deposition includes particulates and gaseous Hg
- Uptake by foliage
- Variable across landscape



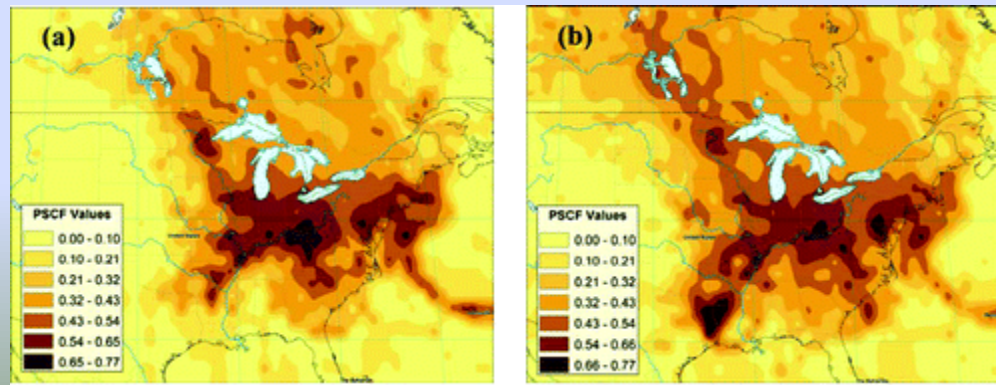
Adirondack Park

- Largest park in the continental U.S.
- Important conservation and recreation area
- Receives mercury deposition from local, regional, and global sources
- Biological mercury “hotspot”
- Park-wide fish mercury advisory plus 55 individual water body advisories



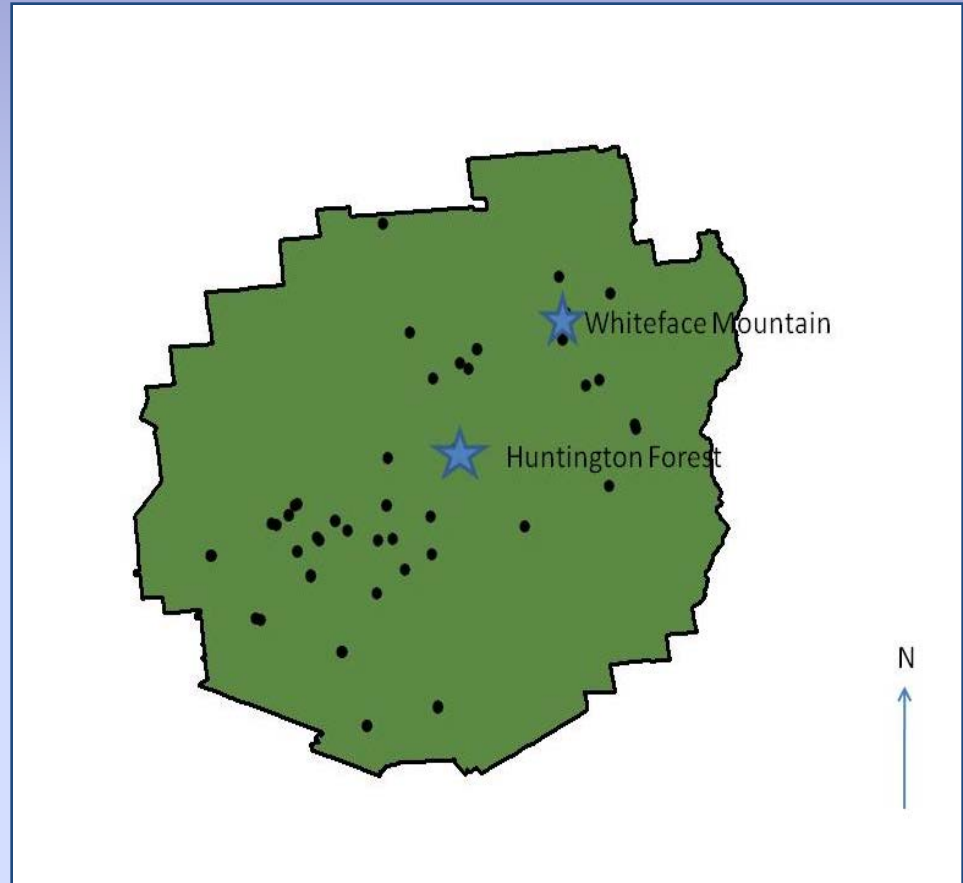
Mercury Deposition in Adirondack Park

- Historical yearly deposition $5 \mu\text{g}/\text{m}^2$; current estimates $9 \mu\text{g}/\text{m}^2$ (Lorey and Driscoll 1999)
- Regional Sources
 - Ohio Valley, Pennsylvania, Texas
- Global Sources
 - Up to 20% from Asia (Seigneur et al. 2003)

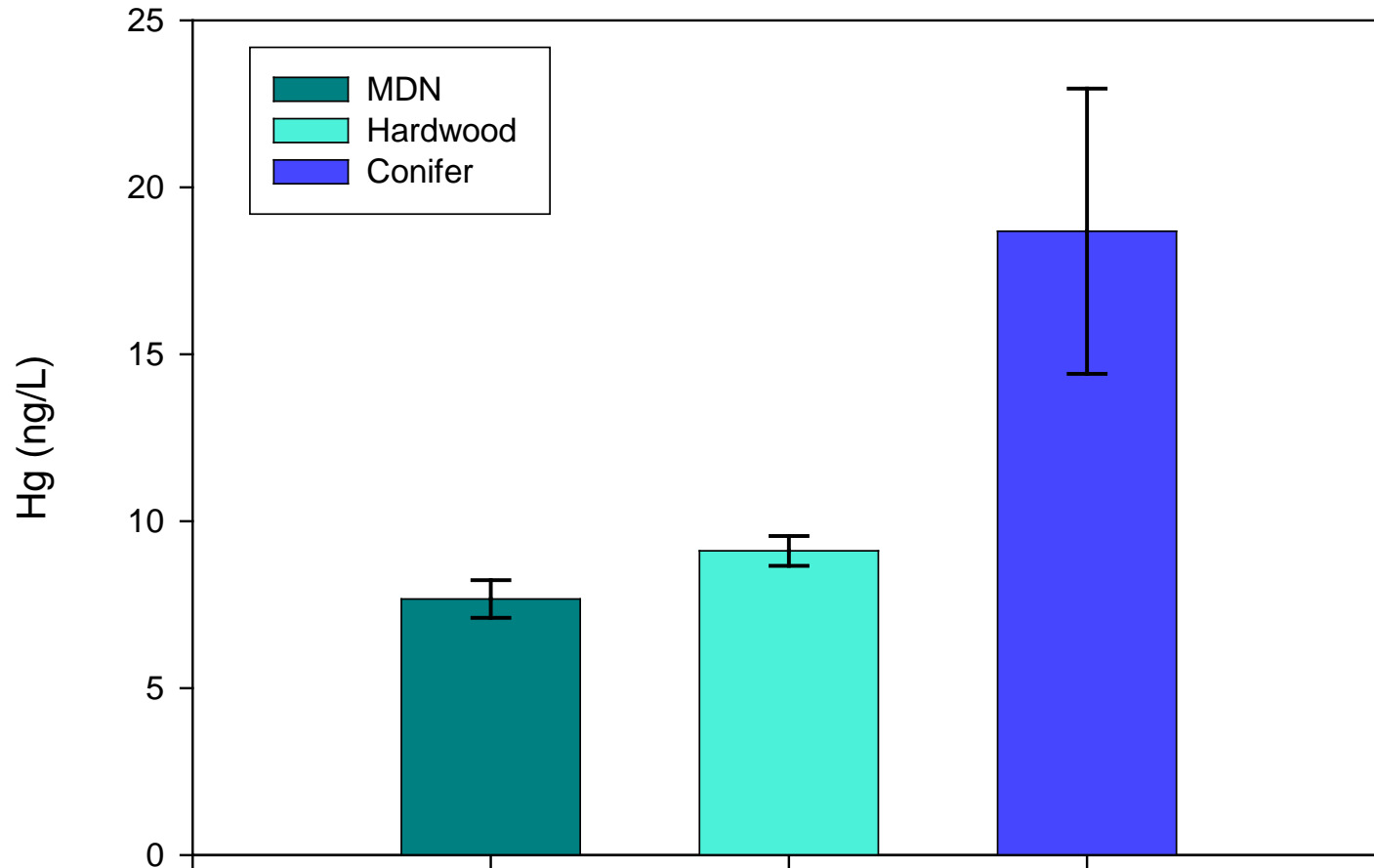


Research Overview

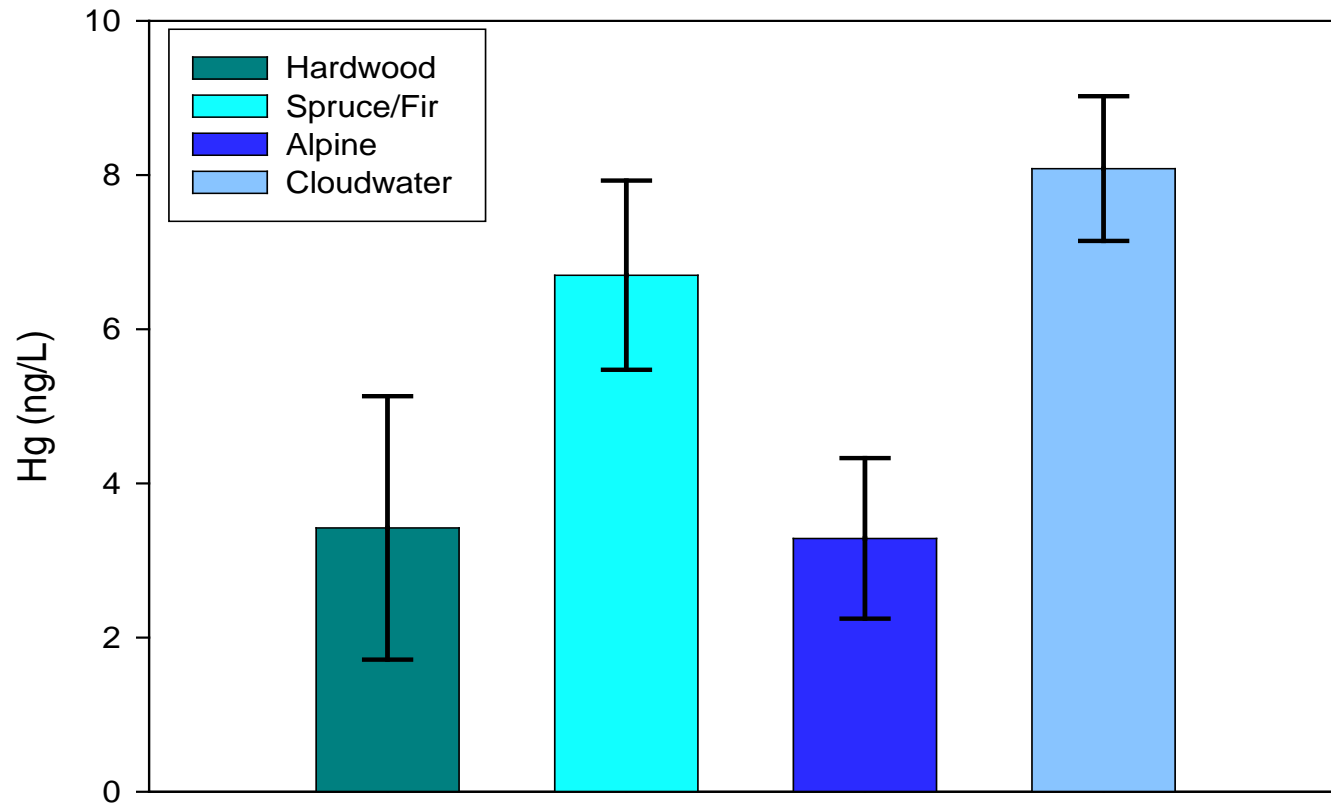
- Phase 1: Compare mercury cycling dynamics in hardwood and conifer forests (Huntington Forest)
- Phase 2: Examine mercury deposition along an elevation gradient (Whiteface Mountain)
- Phase 3: Conduct spatial analysis of mercury in foliage and soil across Adirondack Park (50 sites)



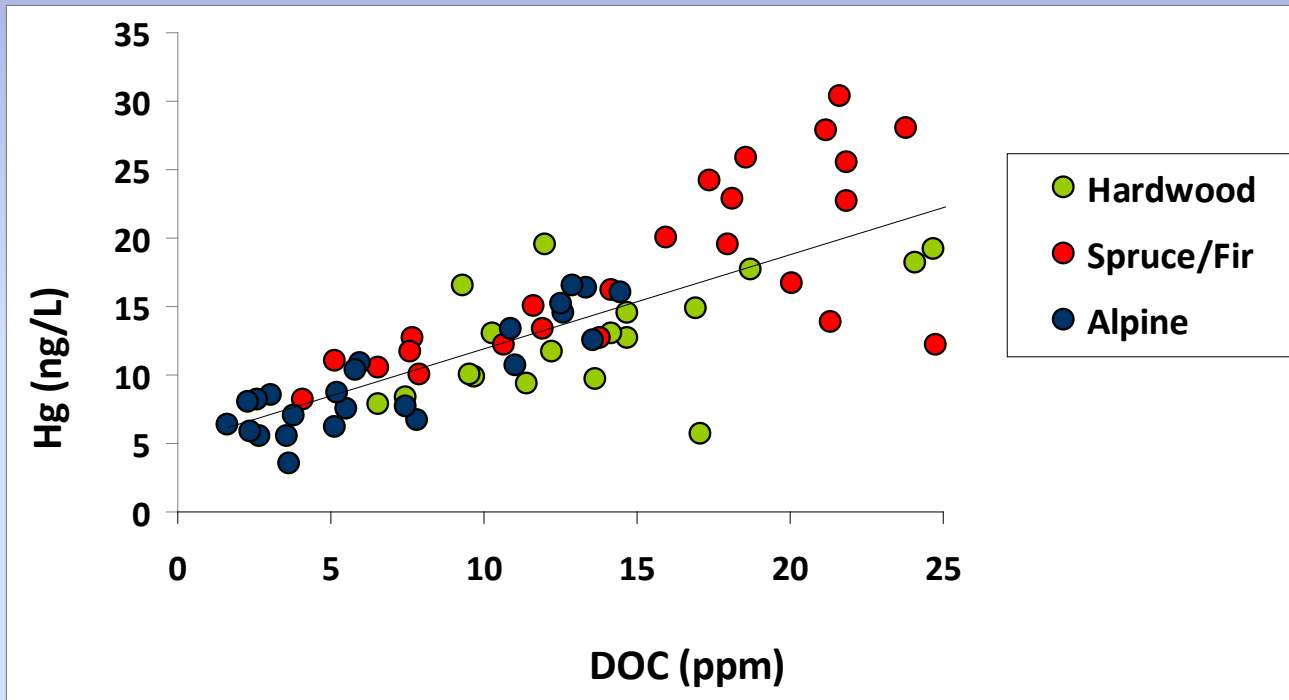
Wet Deposition – Huntington Forest



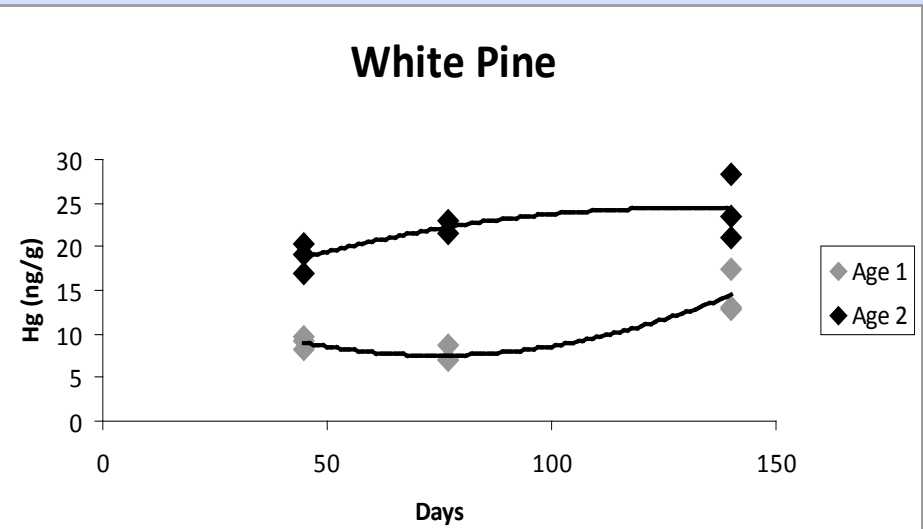
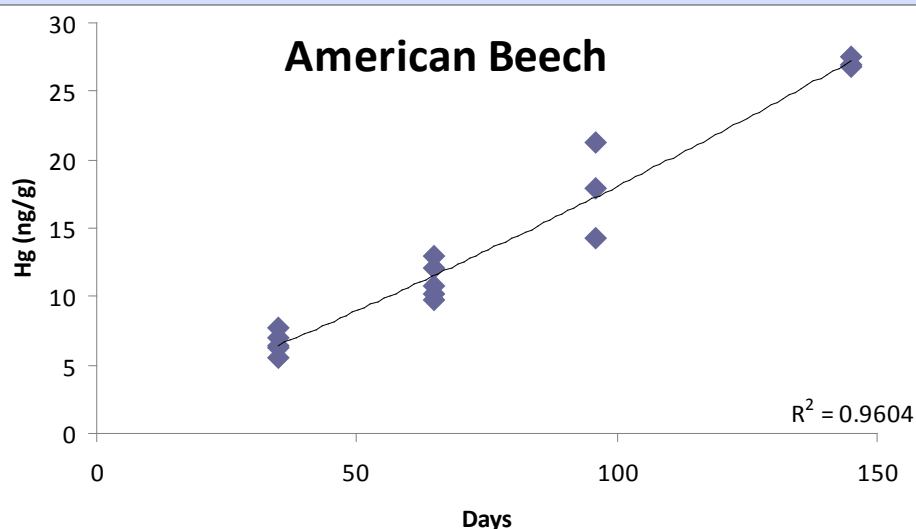
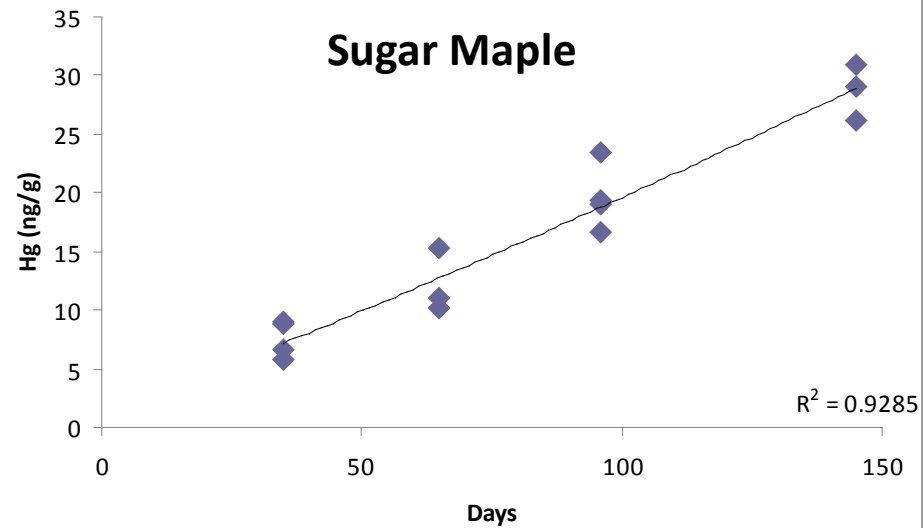
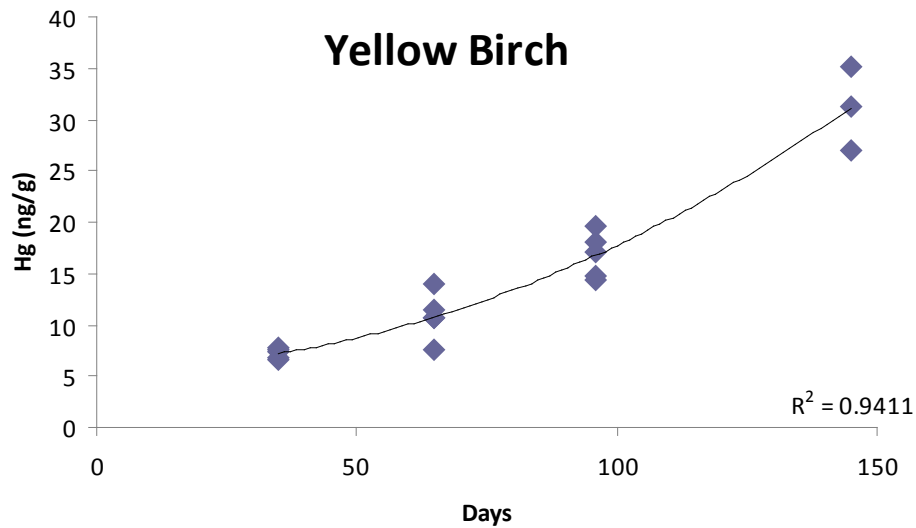
Wet Deposition – Whiteface Mountain



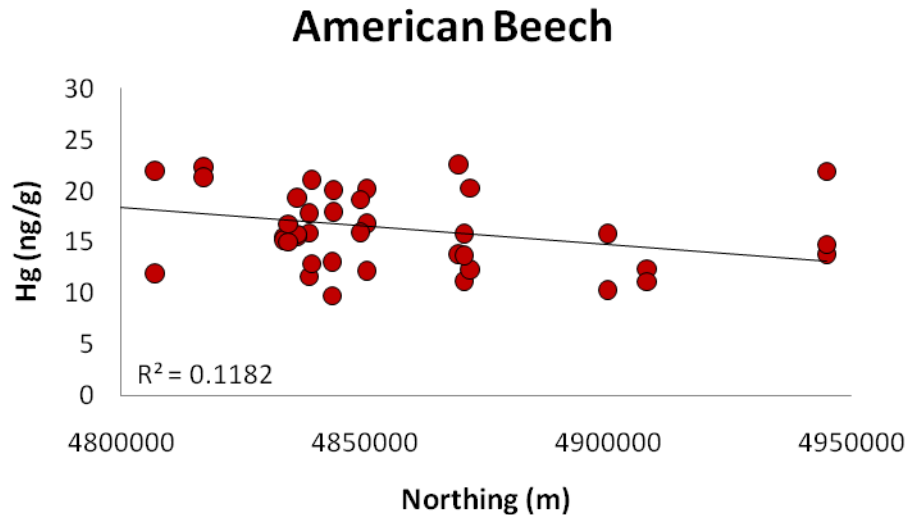
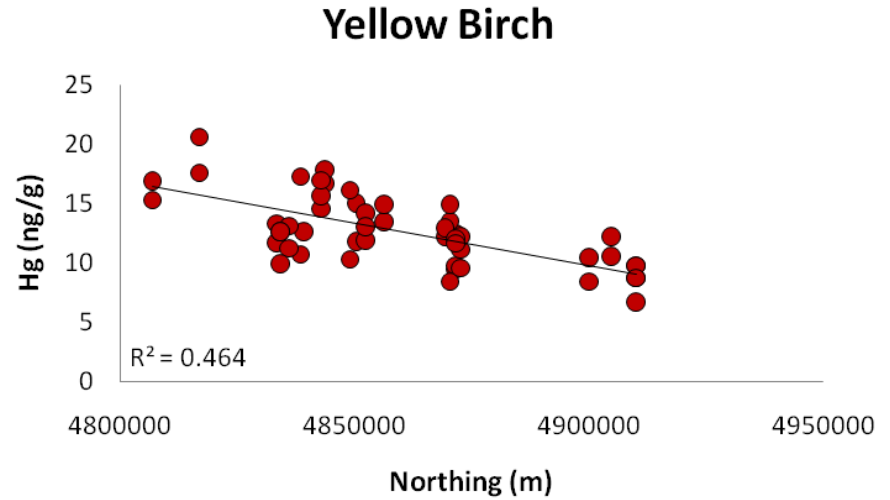
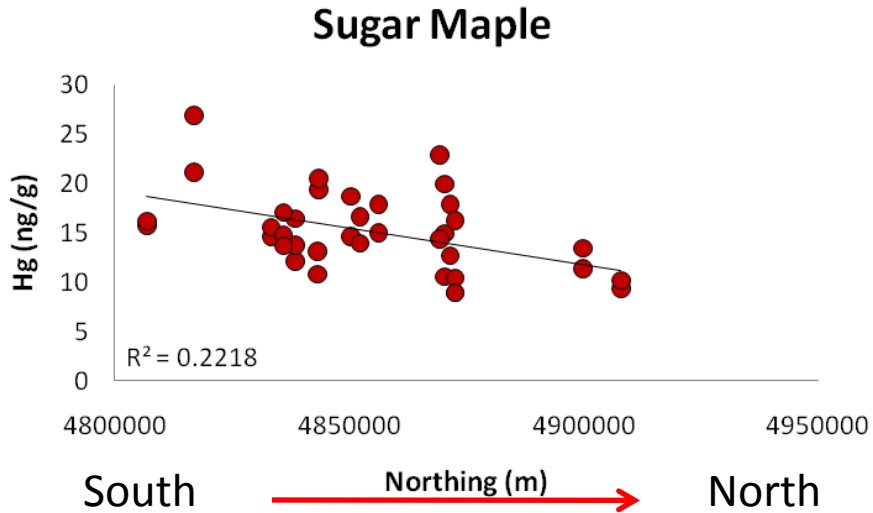
Wet Deposition – Whiteface Mountain



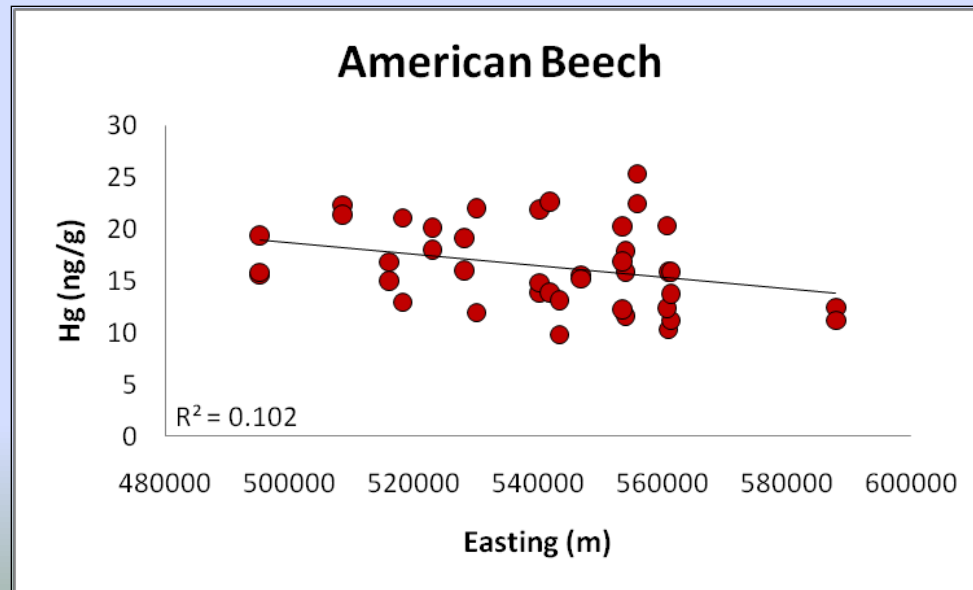
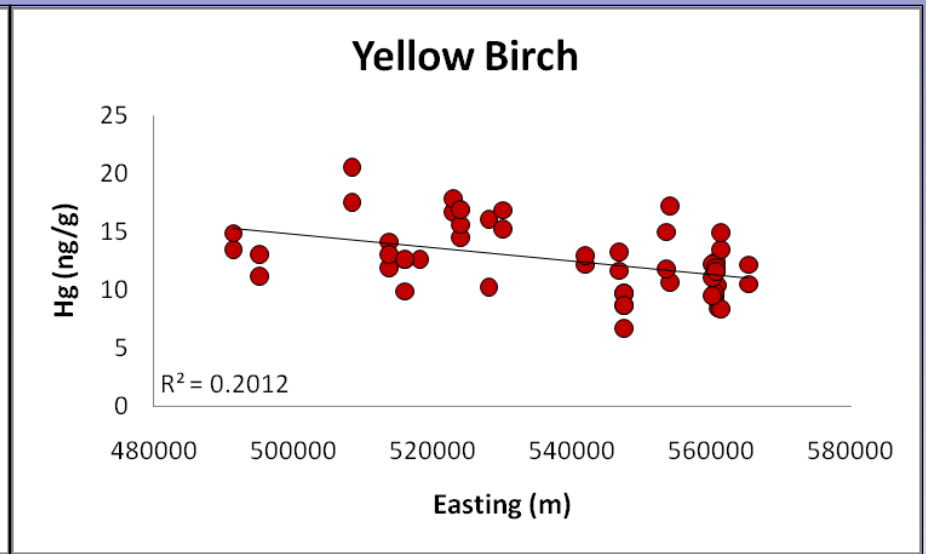
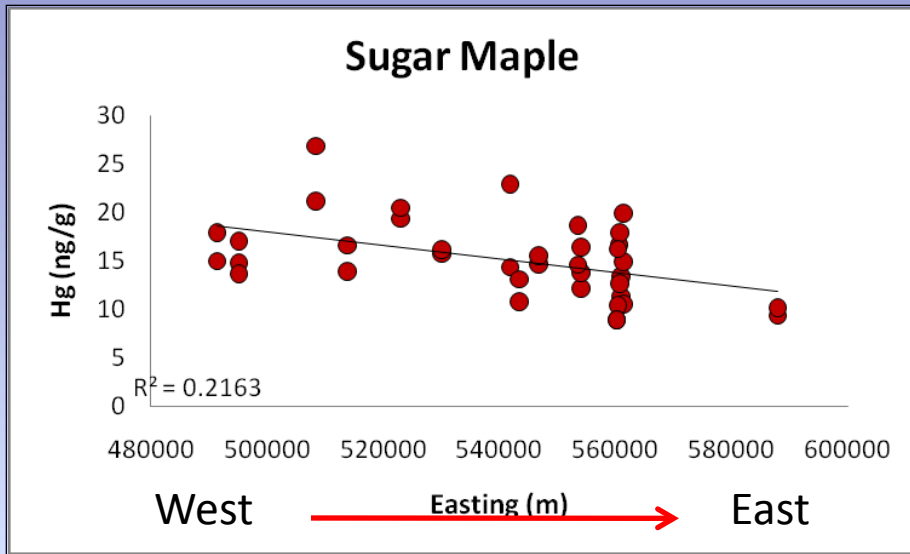
Foliar Mercury - 2010



Spatial Survey - Latitude

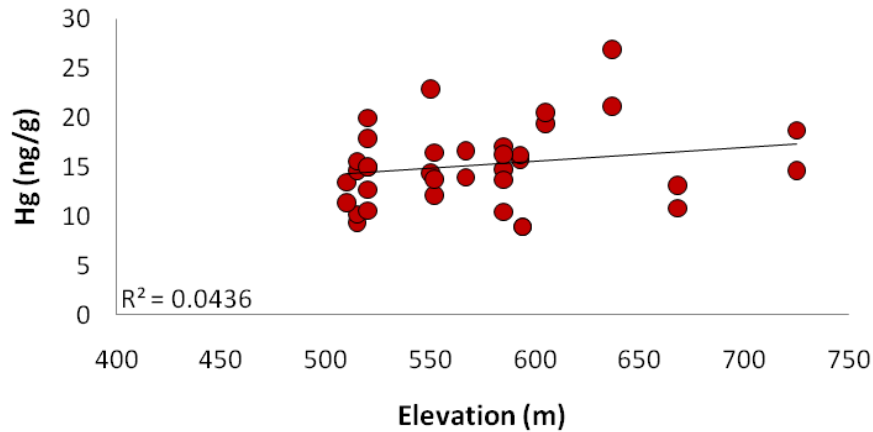


Spatial Survey - Longitude

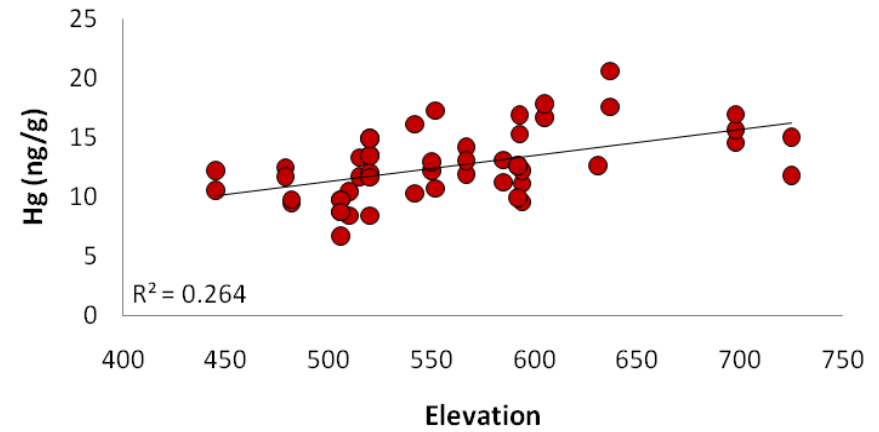


Spatial Survey - Elevation

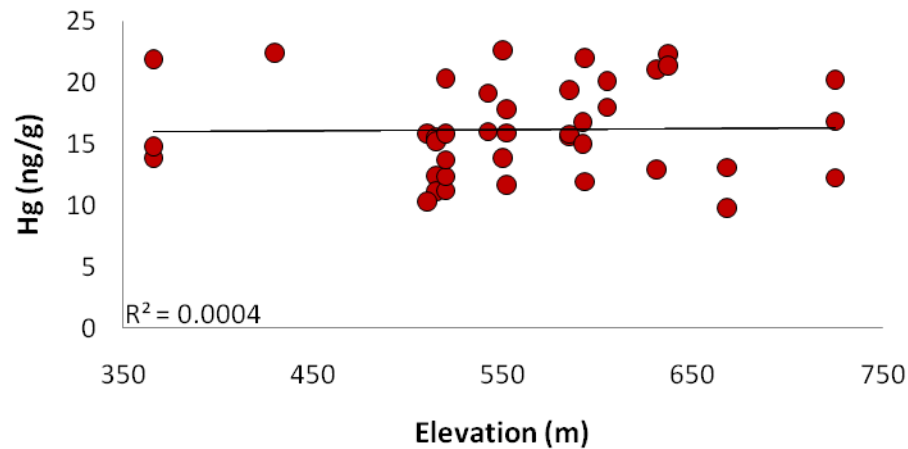
Sugar Maple



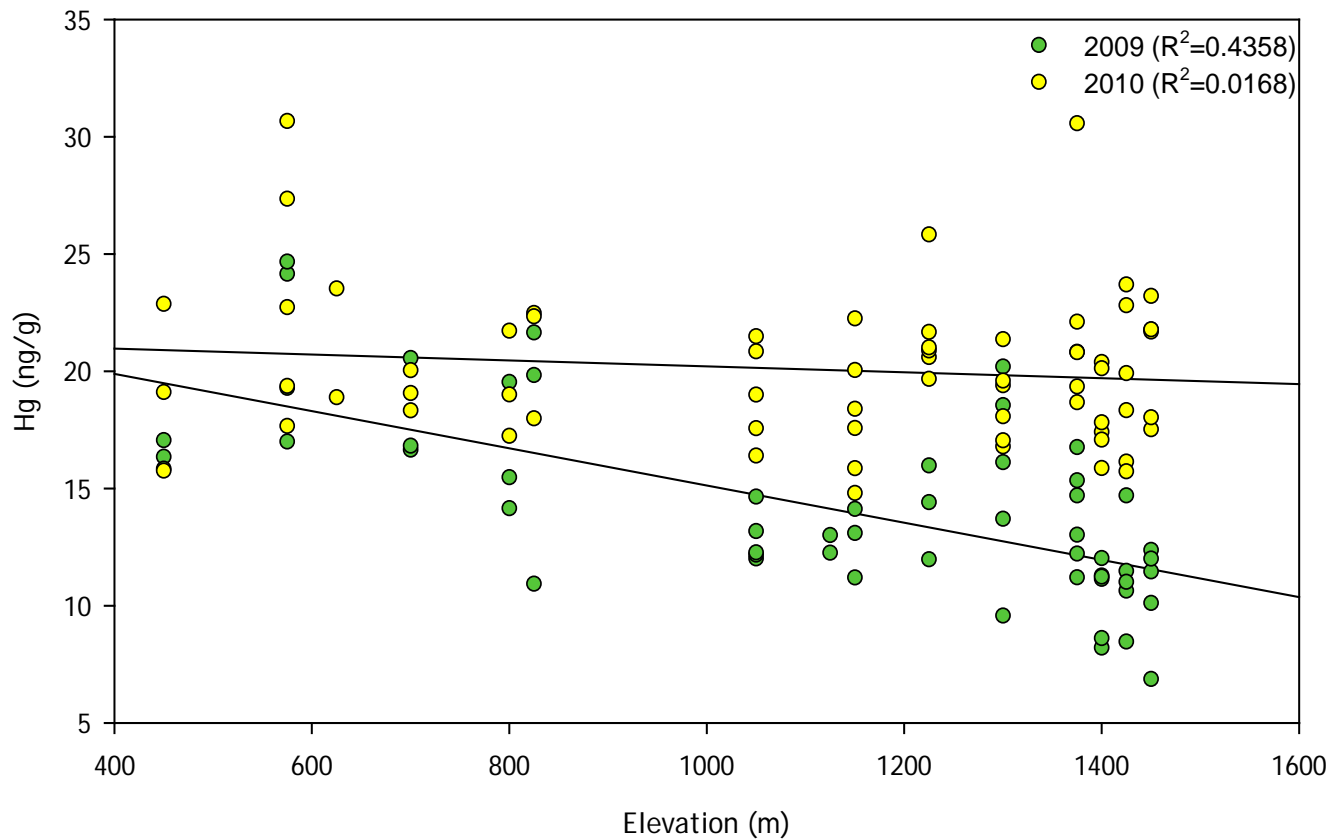
Yellow Birch



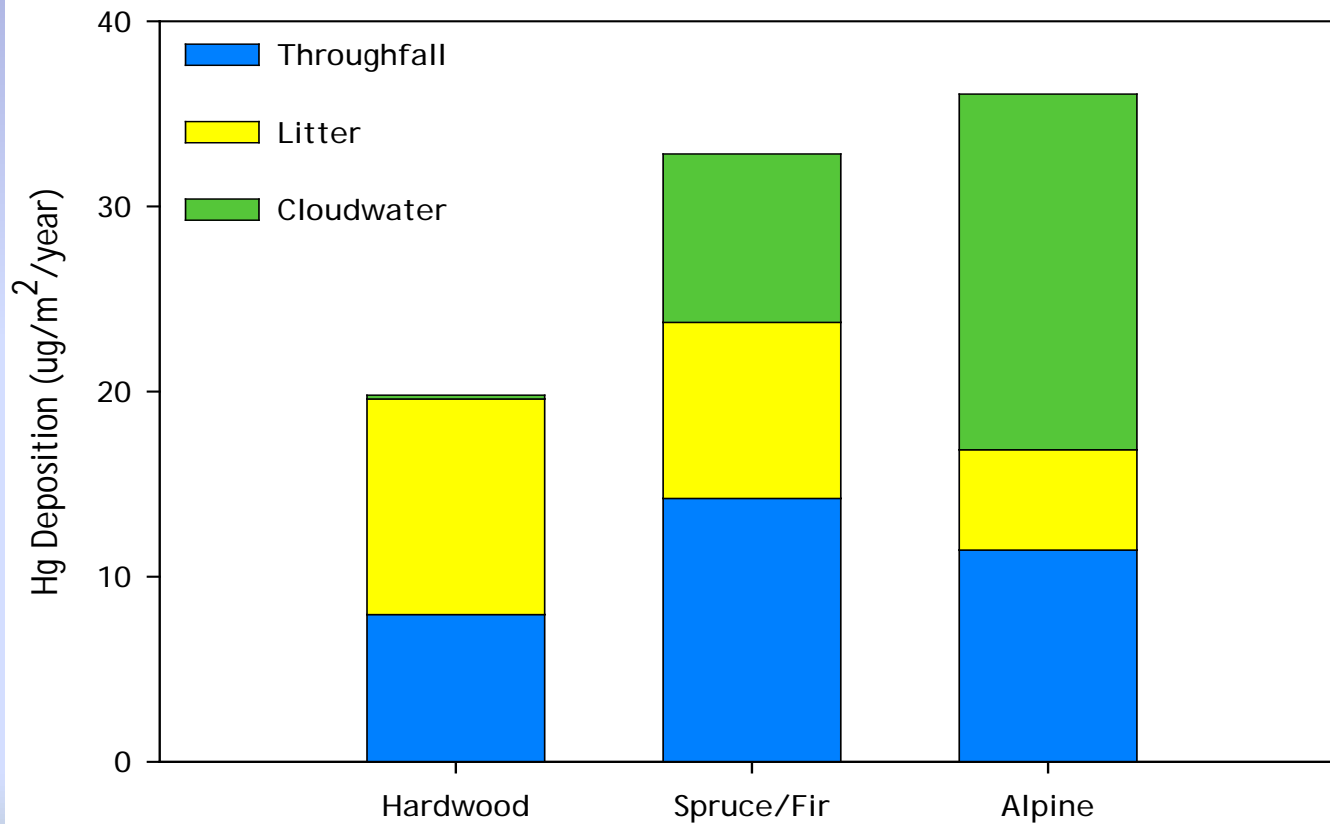
American Beech



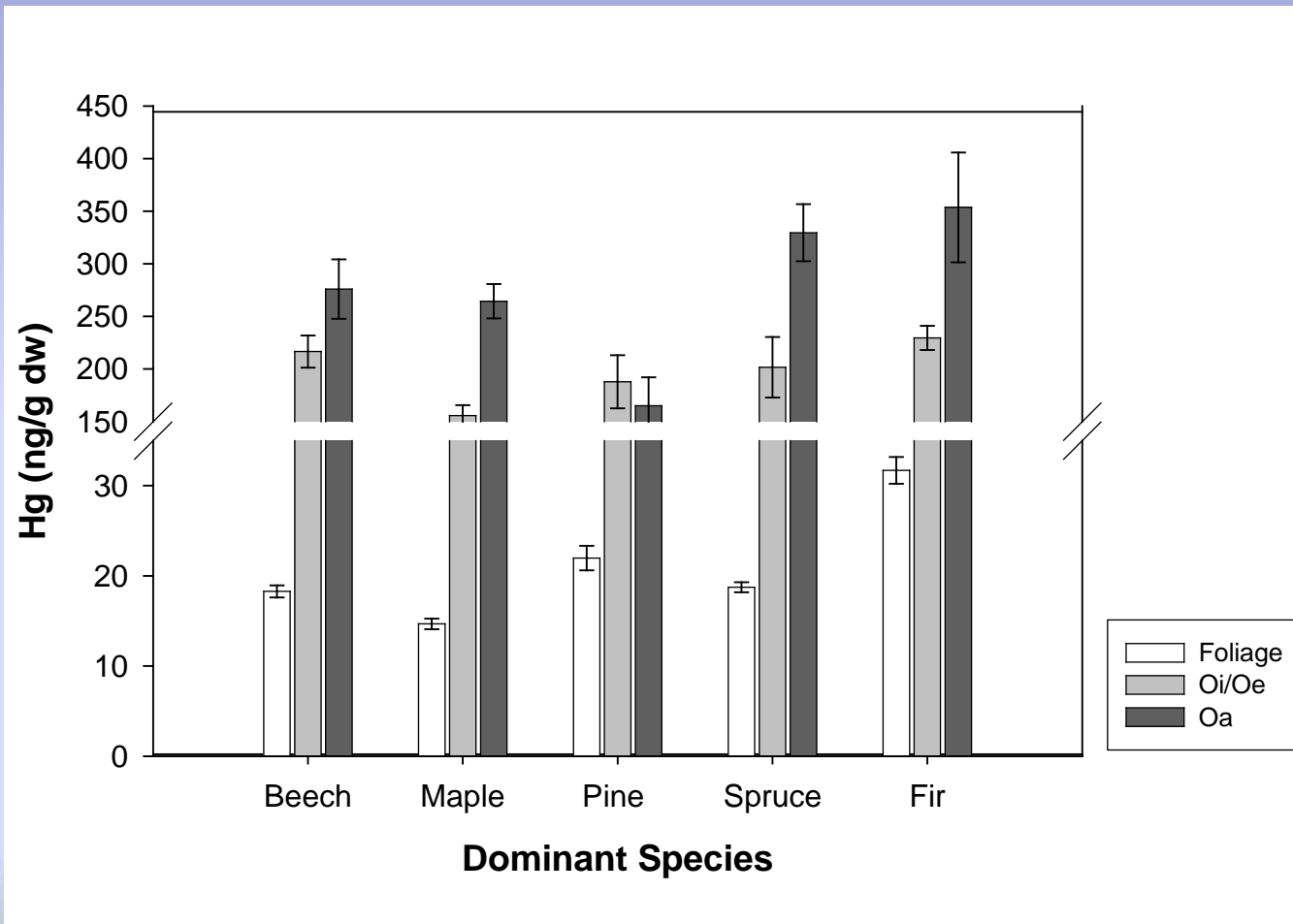
Foliar Mercury Elevation Patterns (Paper Birch)



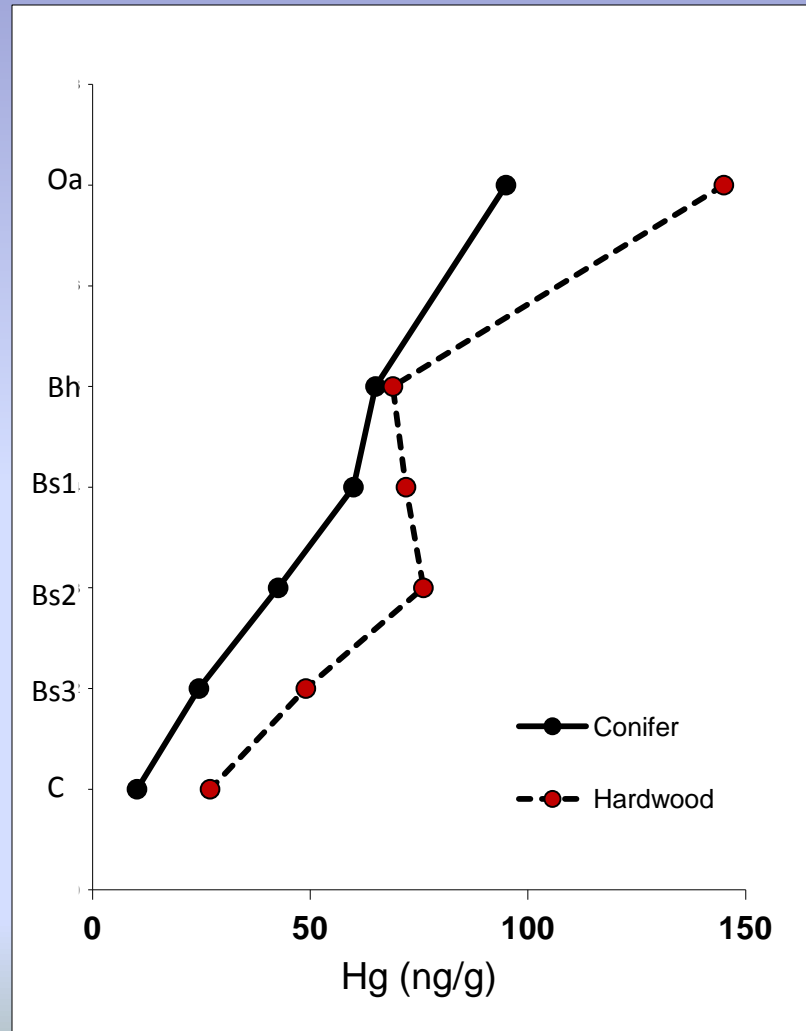
Deposition Totals – Whiteface Mountain



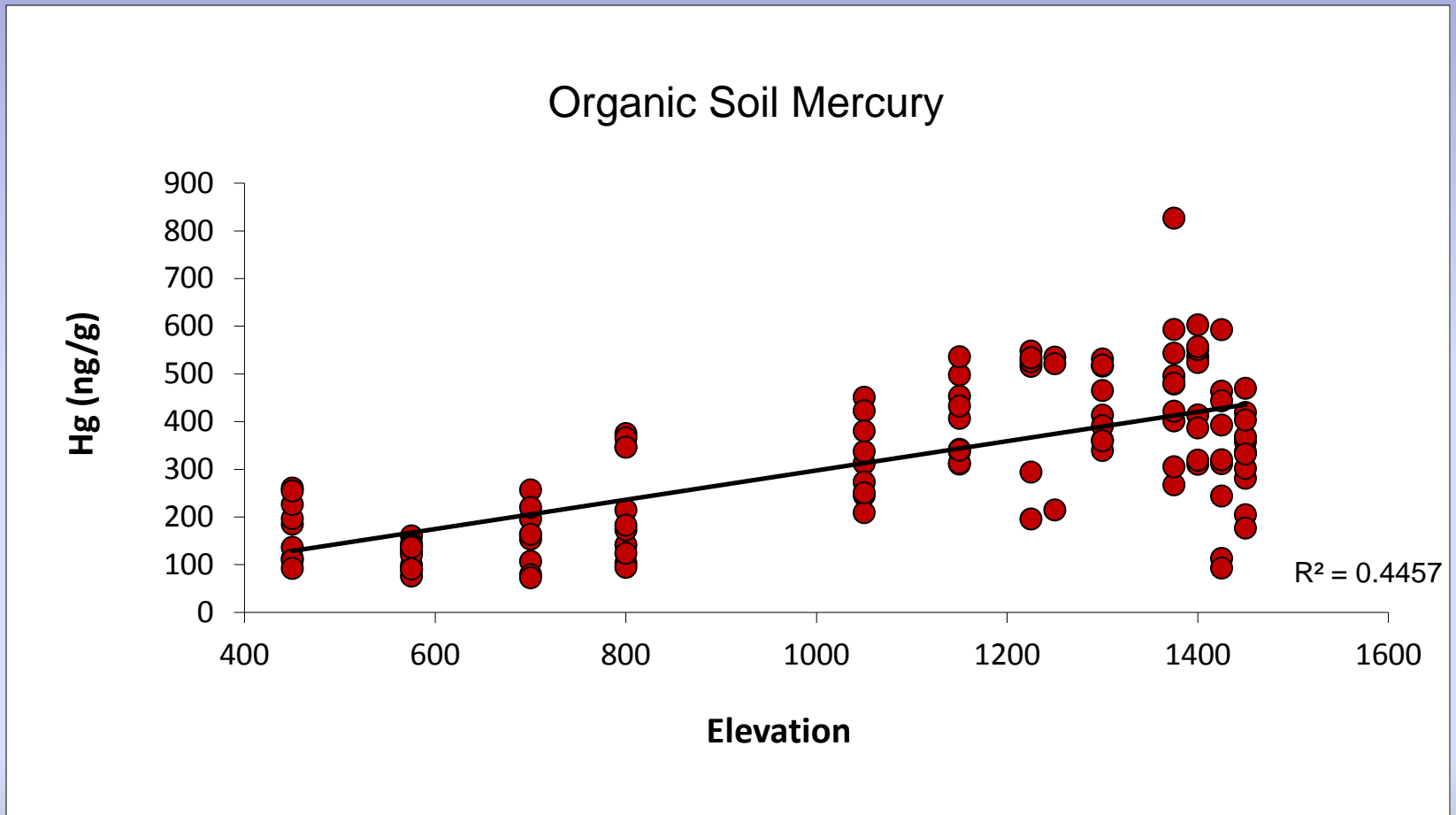
Foliar – Soil Mercury



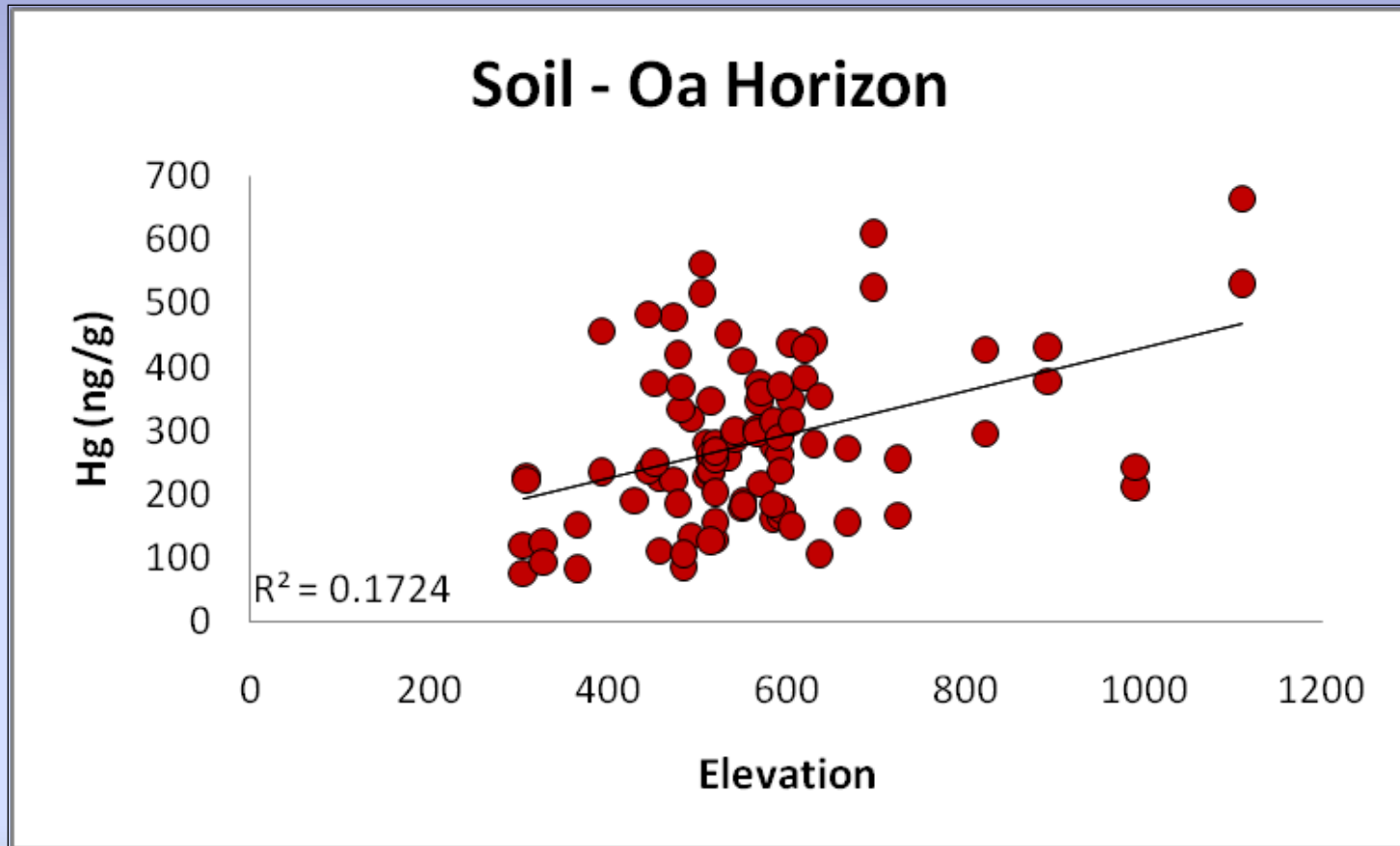
Soil Profiles – Huntington Forest



Soil Patterns



Spatial Survey - Elevation

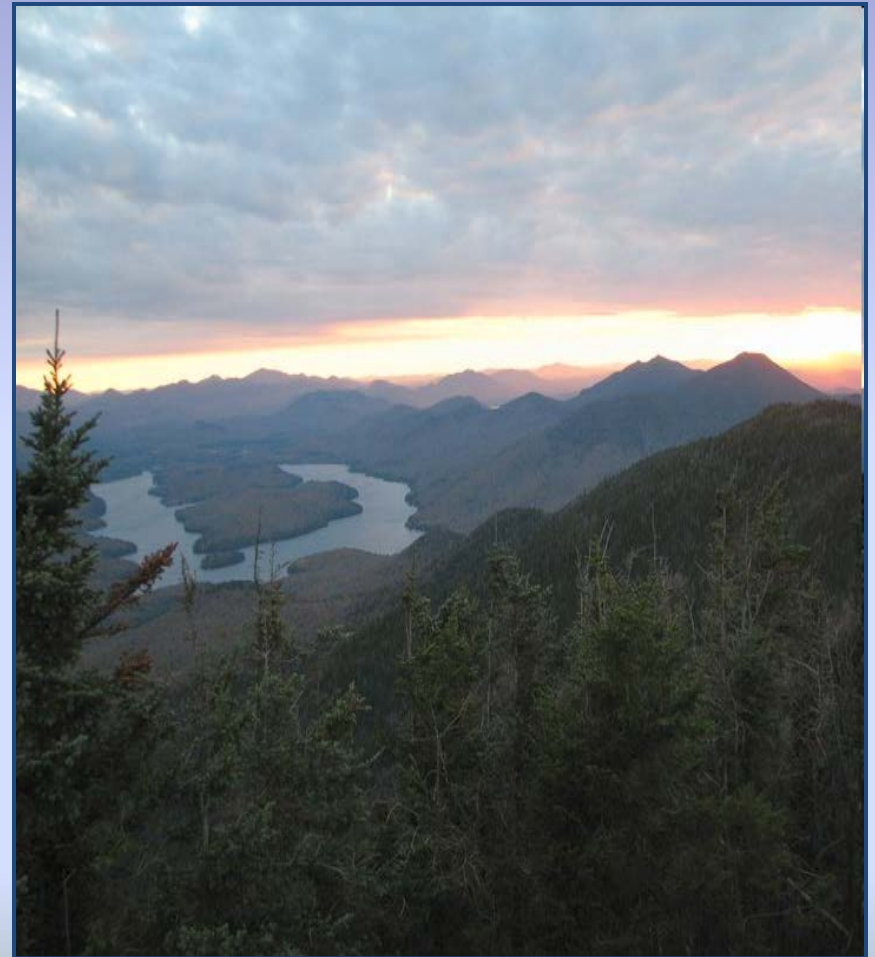


Conclusions

- Deposition pathways contribute mercury differently among different forest types
- Mercury accumulates and concentrates in organic soil layers
- Latitude, longitude, and elevation all have significant effects on foliar and soil mercury concentrations in Adirondack Park

Future Plans

- Publish data presented
- Develop model and map of atmospheric deposition in Adirondack Park
- Create GIS layer of mercury deposition that will be available to researchers and managers



Acknowledgements

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