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# Predictions of the Effect of Wetland-type Soil on Water Chemistry in the Lake Sunapee Watershed, NH

Hannah Roebuck  
*Bates College*

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# Predictions of the Effect of Wetland-type Soil on Water Chemistry in the Lake Sunapee Watershed, NH

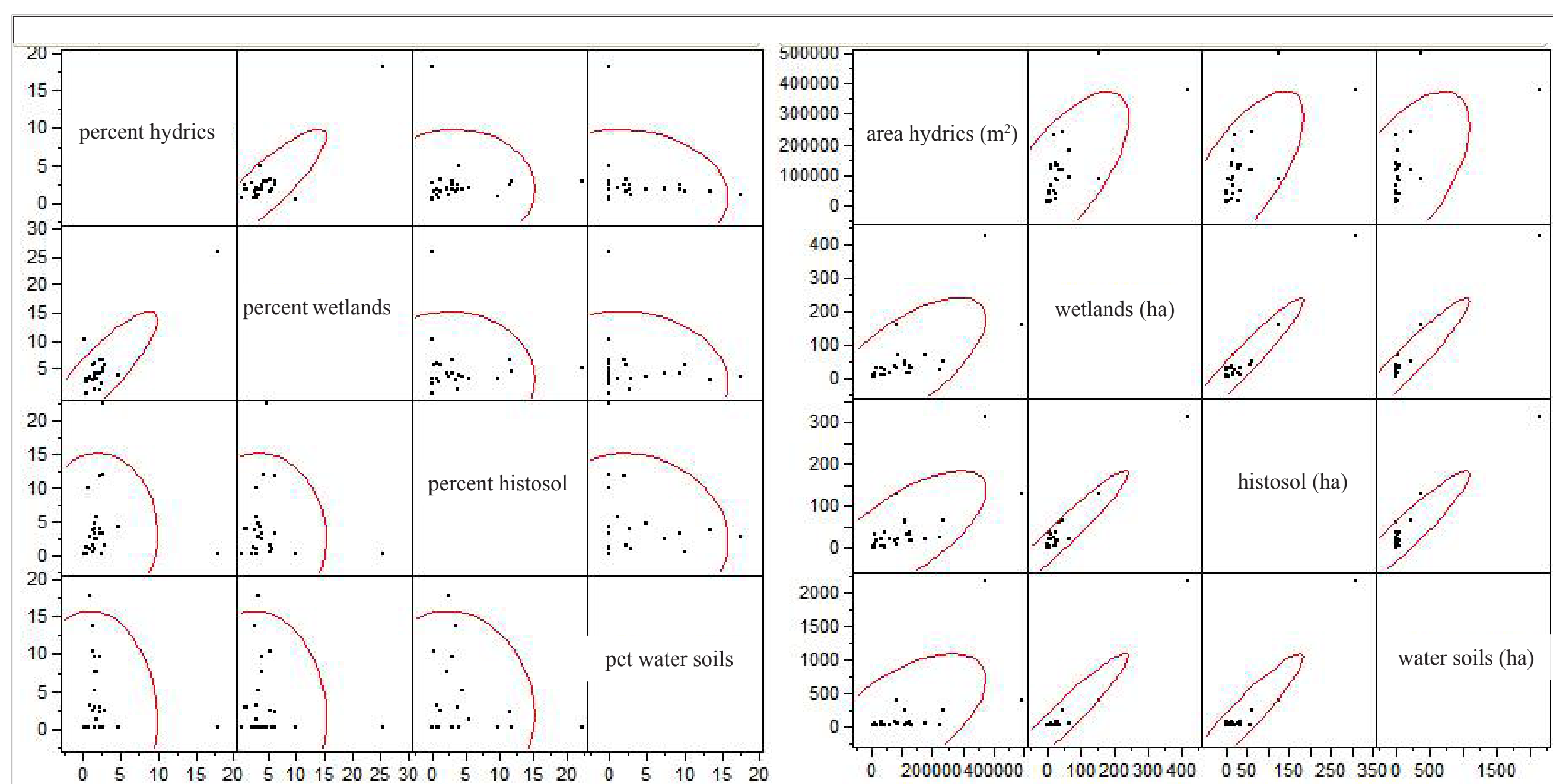
Hannah Roebuck, Environmental Studies and Geology Programs, Bates College, Lewiston, ME

## Motivation

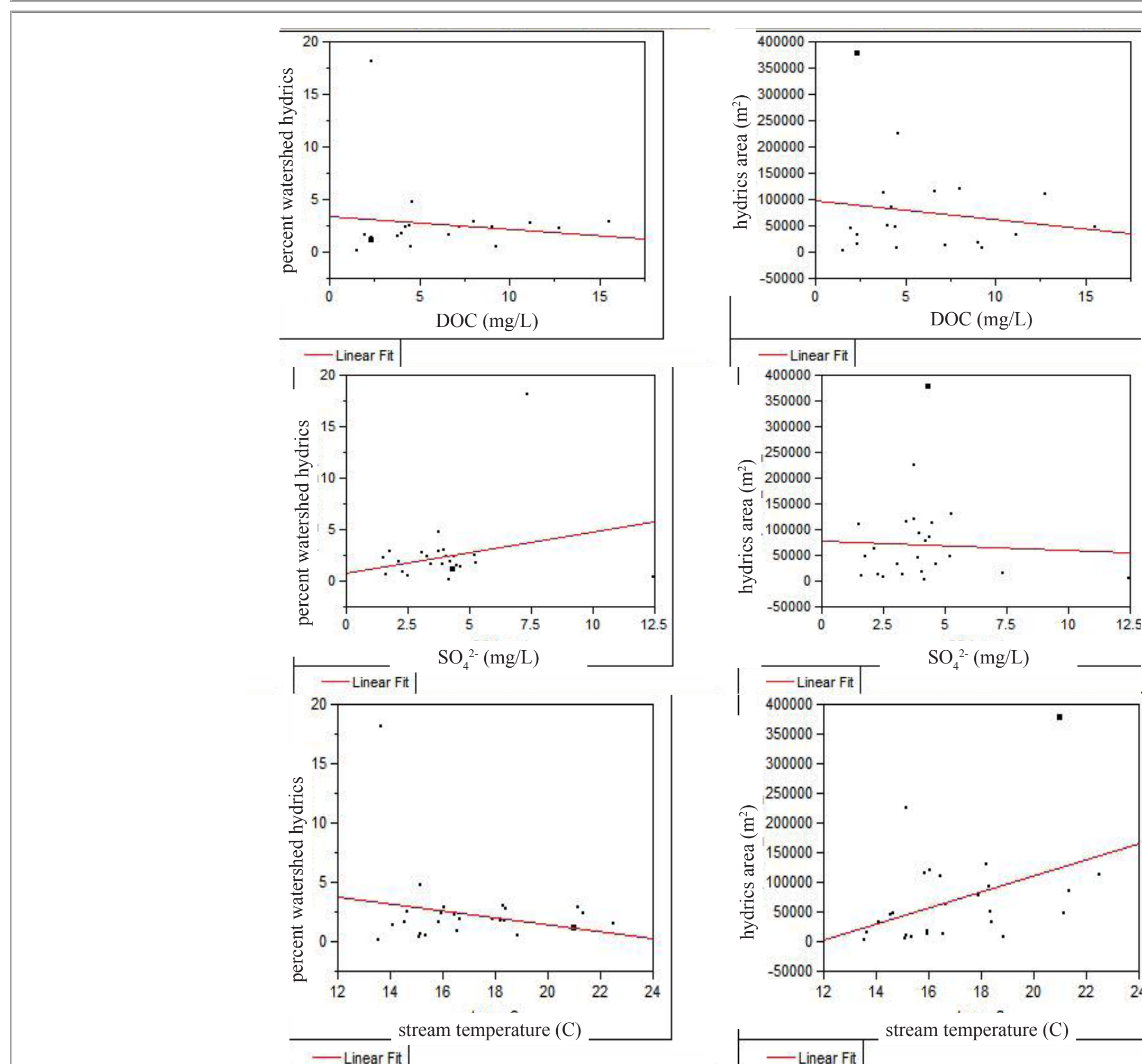
Inorganic mercury (Hg) is ubiquitous in the environment (atmospheric sources). Under certain conditions Hg can be converted to its organic form, methylmercury (MeHg), which is a neurotoxin and bioaccumulates. Wetlands (hydric soils) are considered a site of this methylation process.

## Question

Does (1) Total area of wetlands soils in a watershed, (2) Percentage of wetland soils in a watershed or (3) The proximity of wetland soils to the sampling site matter most in predicting associated stream water characteristics (here: DOC, sulfate and temperature)?

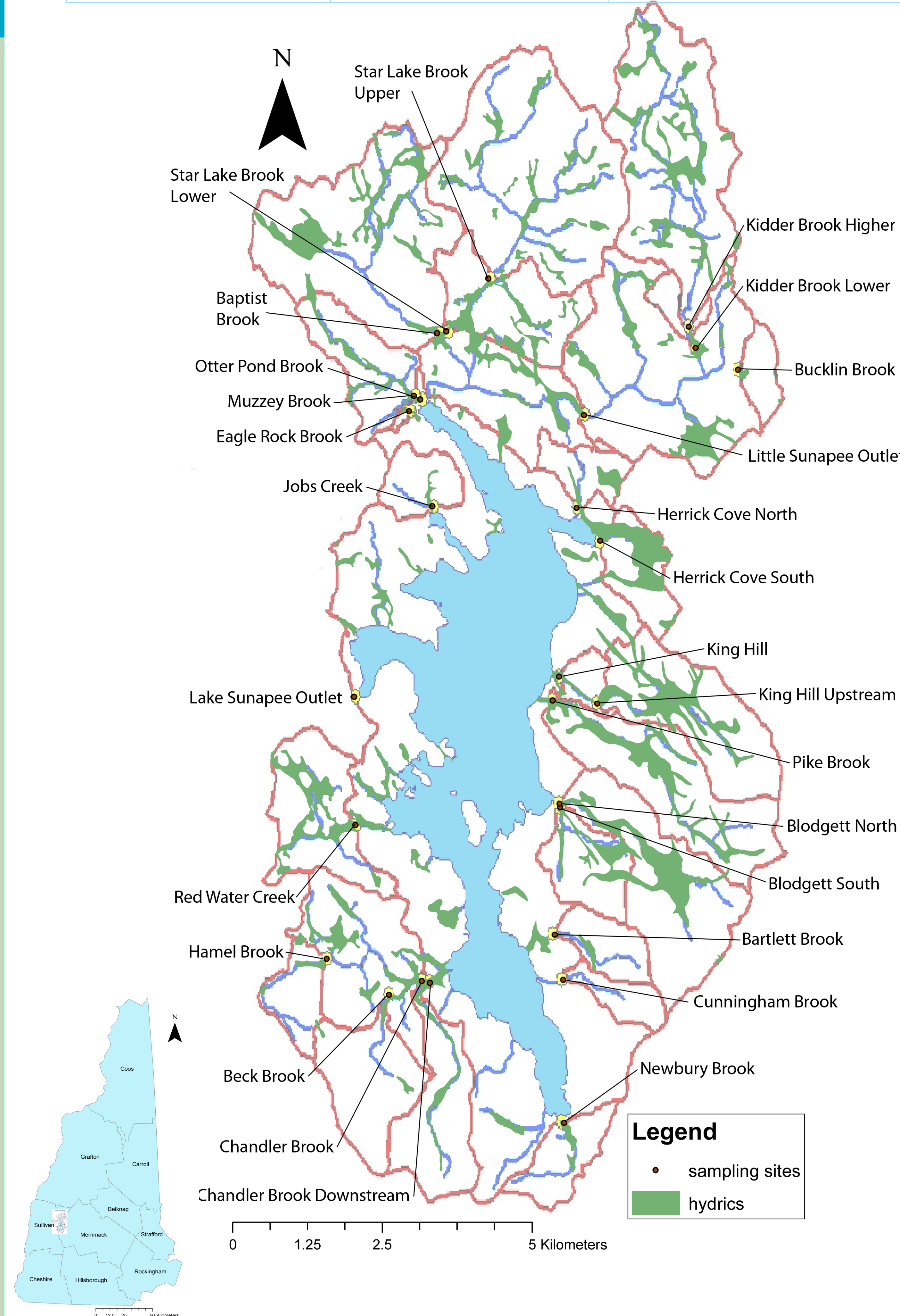


**Correlations of the new classification (hydric soils) to the previous classifications of wetlands, Histosols, and water soils.** Hydric soils are highly saturated soils (>90%). Histosols are saturated soils high in organic content. The red arcs represent the fit of the points in the scatterplot with the arc thinning into a best fit line when there is a high correlation.

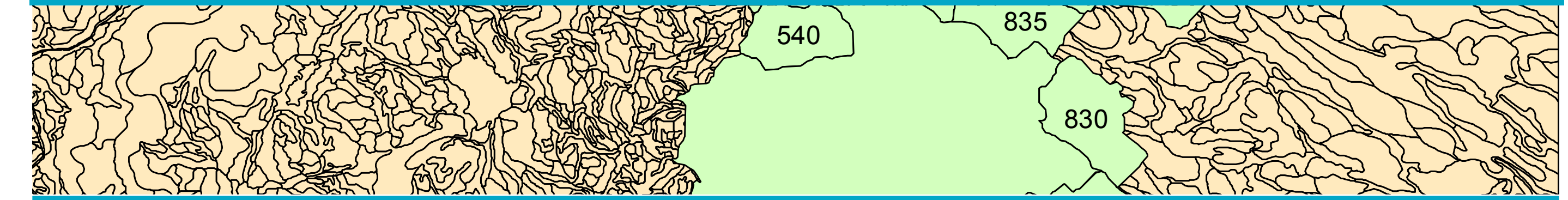


**Correlations of hydric and selected water chemistry characteristics.** No significant correlations present except for that of hydric area and the sampling site stream temperature.

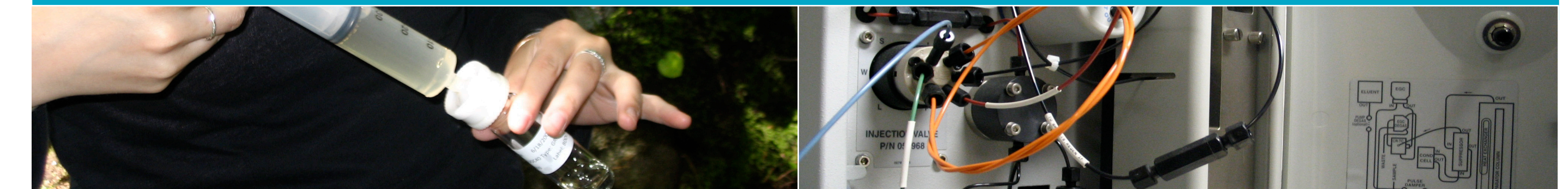
Characteristic	Effect	Comments
Dissolved Organic Carbon (DOC)	Possible increasing/decreasing effect on bioavailability	<ul style="list-style-type: none"> <li>High [ ] : co-transport; metal uptake with DOC for microbes</li> <li>Low [ ] : lower bioavailability</li> </ul>
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	Hg ► Methyl Hg	<ul style="list-style-type: none"> <li>Stimulate methylating bacteria</li> </ul>
Temperature	Possible increasing/decreasing effect on Hg methylation	<ul style="list-style-type: none"> <li>Cold : optimal for some bacteria</li> <li>Warm : may increase metabolism</li> </ul>



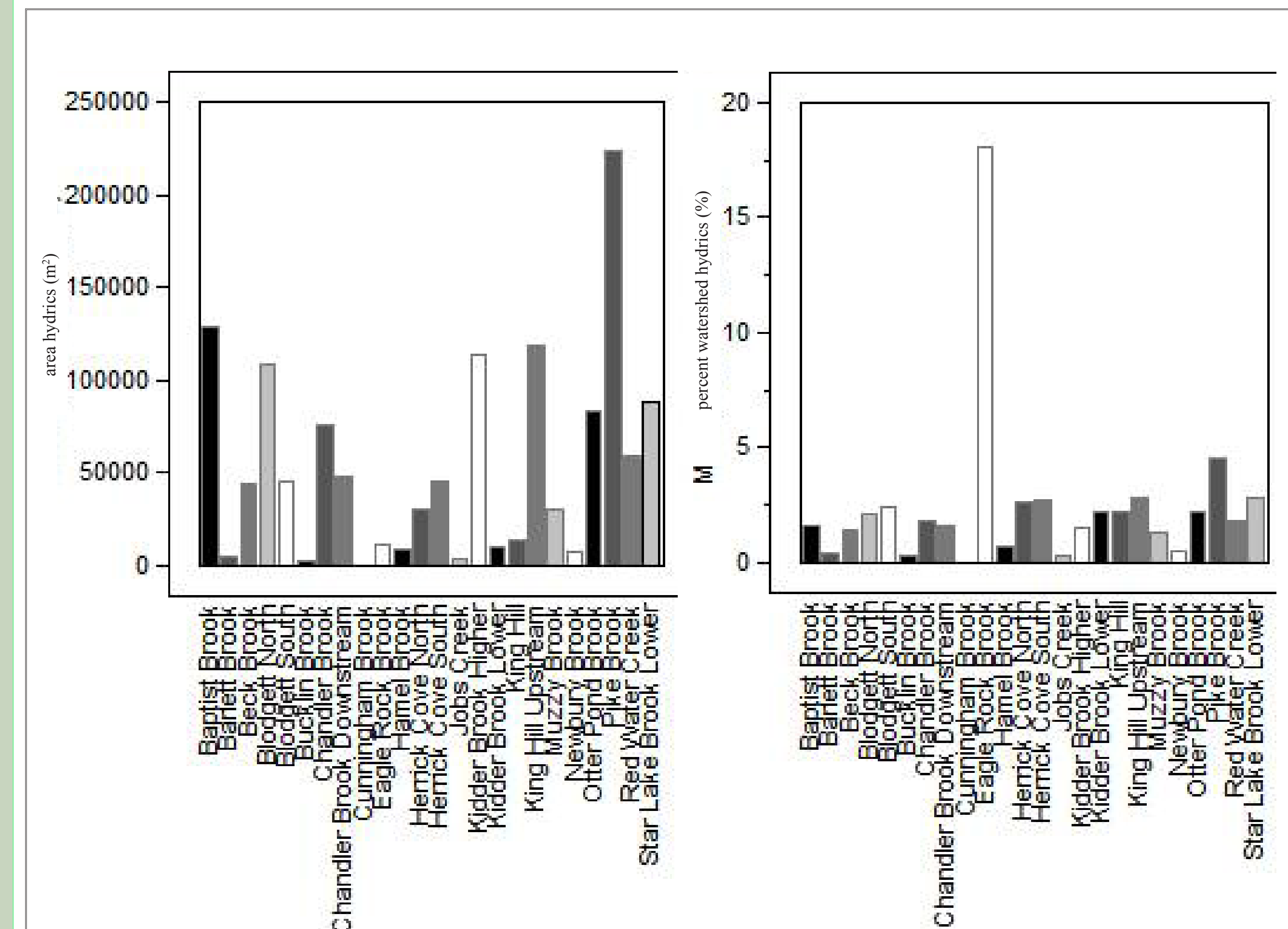
## Methods



**Layers:** (1) original soil files from Natural Resources Conservation Service, (2) modified version from Bethel Steele, (3) delineation by Amanda Elliot



**Analyzing:** (4) clipping down to 'hydrics,' (5) determine total area, percent, distance for each watershed, (6) considering upstream watersheds, (7) correlations and trends with water characteristics (summer data only)



**The area of hydrics within each watershed and percent of each watershed that is hydric (90% or more saturated).** The graph does not include the outlet sampling sites of Lake Sunapee and Little Lake Sunapee. Pike Brook has the highest total area of hydric soil in it while Eagle Rock Creek has the highest land cover percentage in saturated soils.

## Correlations to previous classifications

- Classification of hydric soils area is significantly correlated ( $p < 0.0001$ ) with the previously used classifications: wetlands, Histosols, and wet soil area
- Percent of the watershed hydric soils is not significantly correlated with percent wet soils or Histosols, but is with wetlands
- Distance measurements (sampling site to hydrics) appears to be irrelevant

## Correlations to water characteristics

- Temperature correlates with the area within the watershed in hydrics ( $p = 0.0361$ ) and with Histosols ( $p = 0.0101$ )
- DOC and SO<sub>4</sub><sup>2-</sup> correlate ( $p < 0.0001$ ,  $p = 0.0201$ ) with percent of the watershed Histosols

## Acknowledgements

I would like to acknowledge the time that Amanda Elliot spent in making, and working with Holly Ewing and me to edit, the watershed delineations. I would also like to thank Bethel Steele for the work she did in preparing a set of soil layers. A thank you to Camille Parrish, Dykstra Eusden, and Matt Duvall for GIS help along the way. And thank you to Holly Ewing, Dave Richardson, Nick Baer, Christina Maki, Alyeska Fiorillo, and the Lake Sunapee Protective Association for all contributing to the water chemistry dataset.

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