Weathers, K.C., *Ewing, H.A., Baer, N.A., Chen, C.Y., Roebuck, H.J., Maki, C.E., Richardson, D.R., Lindsey, A.M., Wilson, A., Chikering, J., Fiorillo, A.U., Cottingham, K.L.

The relationship between mercury (Hg) deposition and methyl mercury(MeHg) accumulation in aquatic biota is often indirect, at best. We suggest that both landscape and biogeochemical heterogeneity are the reasons. Mercury deposition is estimated to be approximately 7 µg Hg/m2 per year to southeastern New Hampshire, based on Mercury Deposition Network monitoring sites. However, these estimates do not take into account variability in deposition at the spatial scale of hectares. In addition, the biogeochemical transformations and effects of this deposited Hg are likely to differ across the landscape.

We modeled Hg deposition and examined landscape characteristics and water chemistry across 12 tributary watersheds that drain into Lake Sunapee, NH, a large, recreational lake that is also a drinking water source. Using a landscape model that accounts for differences in watershed elevation and vegetation, across-watershed deposition was modeled to differ only by about 25% among watersheds, between 9.5 and 12.4 ug/m2. In contrast, total Hg concentrations in streamwater ranged nearly eight-fold, from 322 to 2250 pg/L across watersheds. MeHg concentrations in streamwater were even more variable, ranging over an order of magnitude across streams (23-854 pg/L) and accounting for 7-42% of the total Hg. Streamwater dissolved organic carbon (DOC) and MeHg concentrations were strongly correlated. The amount of inorganic Hg was positively correlated with modeled Hg deposition and the percentage of the watershed that was coniferous forest. DOC concentrations were best predicted by the percentage of the watershed underlain by Histisols (peat soils), and the percentage of the watershed in wetlands was the best predictor of MeHg.