

Cluster Analyses

In an effort to simplify the stories for these six ponds, we first tried to group ponds together based on visual similarities in the boxplots of their water quality characteristics, and one configuration of characteristics stood out. Specifically, we noticed that on several parameters Bloody Pond, Little Long Pond, and Long Pond all yielded higher measurements than Gallows Pond, Halfway Pond, and Round Pond. This difference among the ponds was exhibited for specific conductivity, sodium, chloride, calcium, magnesium, hardness and alkalinity.

However, there remained the question of whether there was a consistent pattern of differences across this set of parameters. In other words, did these parameters vary together within each group of ponds?

To answer this question, a cluster analysis (K-means) of over 150 water bottle samples taken over this three-year period was performed using these seven parameters as a set of predictors.

Remarkably, all the bottle sample results for Bloody Pond, Little Long Pond and Long Pond fell into one cluster, all the bottle sample results for Round Pond and Gallows Pond fell into a second cluster, and the vast majority of the Halfway Pond were also in this second cluster.

We think the cluster analysis has provided analytical validation that stormwater runoff parameters are having negative effects on our ponds. Salts, sodium, chloride, calcium and magnesium are all found in highway, road and driveway runoff, especially in snowbelt areas.

It has long been known that stormwater runoff can have negative effects on water bodies. Stormwater sweeps up phosphate rich garden and lawn fertilizers residues and household and car wash detergents into and through roadway stormwater systems directly to our ponds. But the results presented in this report indicate that additional runoff factors need to be considered.