

Southern Allegheny: Pine Creek

Project Description :

Pine Creek has displayed trends of elevated chloride levels. A Duquesne University MS student Selina Prettnner, helped 3RQ to research this topic under its targeted studies projects. In addition to Selina, Beth Dakin, Brady Porter, and two students enrolled in Duquesne’s Stream Field Biology class participated in the sampling.

Duquesne University MS student Selina Prettnner has continued her work on the elevated chloride levels in Pine Creek as a targeted study under 3RQ. During this time period members of WRI have met with Lou Reynolds (USEPA) and Dan Bain (Pitt) in order to seek advice on existing hydrologic records for this region as well as their experience in working with other urban watersheds.

On May 10, 2018 Beth Dakin (Duquesne) and Lou Reynolds (USEPA) installed a continuous logger (owned by EPA) in Pine Creek at our sampling site. This will allow the sampling team at Duquesne University to retrieve conductivity and temperature data collected every 15 minutes. The sensor is located downstream of the USGS gage along the Pine Creek bank.



Figure 1. Image of Pine Creek at Grant Street showing where the conductivity and temperature sensor is located.

Sampling :

We have previously sampled 5 sites in the Pine Creek drainage (Figure 1 above; including the Pine Creek-Etna site which is now part of WRI regular 3RQ monitoring) on two previous occasions (3/18 and 11/17) using standard 3RQ monitoring methods (YSI field data and grab samples sent to PACE) and also measuring discharge. On October 4, 2018, 3RQ carried out a third sampling of the 5 sites in Pine Creek. Sampling was completed by Selina Prettnner, Beth Dakin, and Brady Porter, two students enrolled in Duquesne’s Stream Field Biology class.

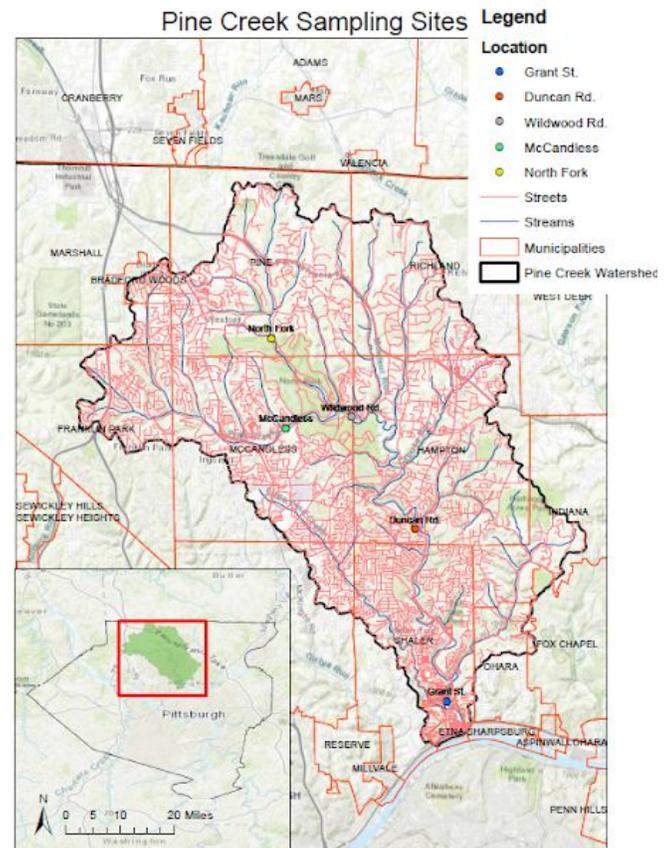


Figure 2. Map of southern Pennsylvania showing the five targeted sampling sites along Pine Creek.

Findings :

Water samples were analyzed for concentrations of various ions. The October 2018 results did not yield any pattern that would indicate a common pollution source. Since chloride concentration has a direct relationship to specific conductivity, we were able to use the logger data to estimate chloride concentrations. Increased water levels showed a subsequent drop in chloride concentration.

Results :

Various ions were tested when collecting water samples from Pine Creek (figure 3). After receiving the results it was found that no consistent pattern to these ions or metals that would indicate a common pollution source.

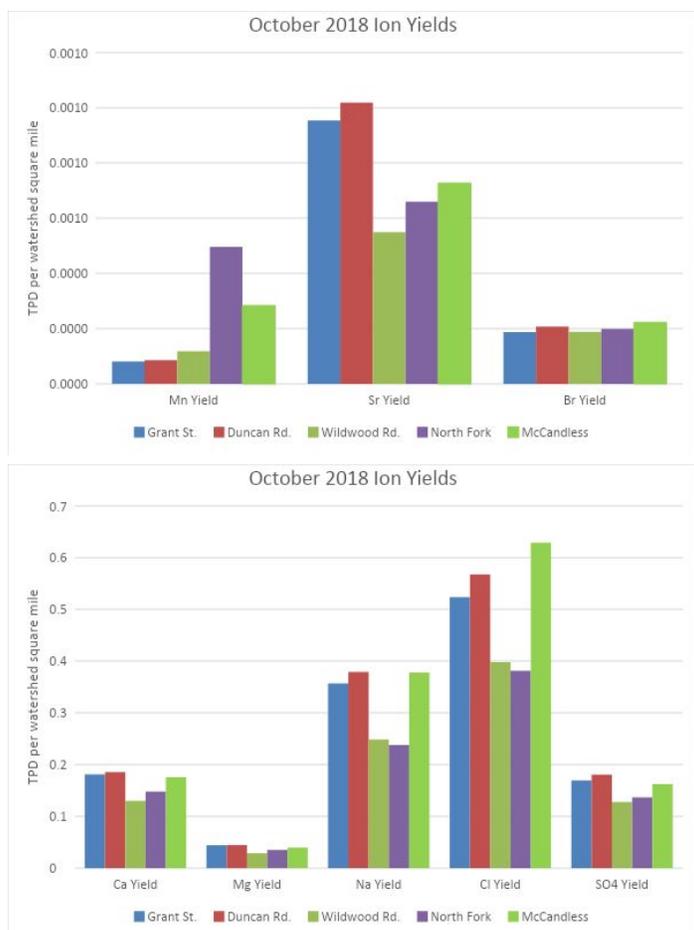


Figure 3. Yield (Tons per day/square mile of watershed) for the five sampled locations in Pine Creek organized from downstream to upstream. Note these two graphs are on different scales.

Using 3RQ data from 2013 to 2014, an estimation for chloride concentrations was able to be generated based on a cubic standard equation (figure 4). Chloride concentration

... has a direct relationship to specific conductivity, allowing us to use the logger data to estimate chloride concentrations.

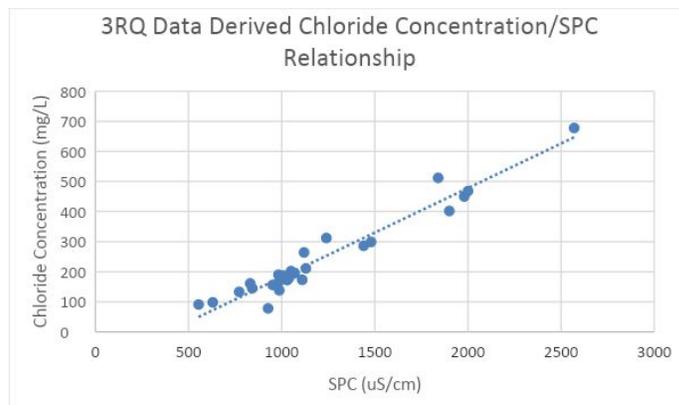


Figure 4. Graph showing the relationship between chloride concentration and specific conductivity (SPC).

A USGS gage located at Pine Creek Etna allows us to associate gage heights (the impact of rain events) and chloride concentration through various storm events. Data from figure 5 displays a correlation with spikes in rainfall leading to lower concentrations of chloride.

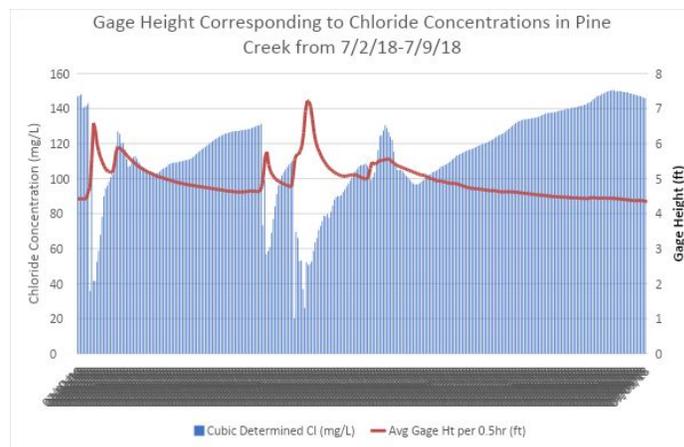


Figure 5. Graph showing data from the USGS gage that is located at the Pine Creek Etna site.

Current Research :

3RQ continues to monitor Pine Creek in its standard monthly monitoring for the Allegheny River. Data for this site and others along the Allegheny can be found on the 3RQ website under the "Data" tab.

Data from this study was also used to examine how snow melt and road salting might contribute to Pine Creek's elevated chloride levels during the winter months.