Evaluation of Sonde Data Collected Near Lake Glenville
November 2017

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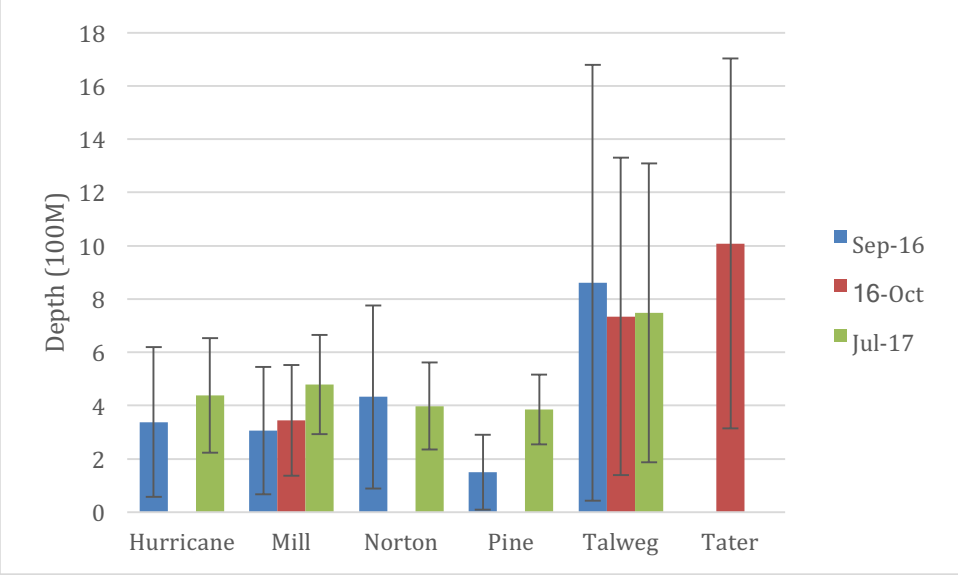
Summary

Chemical and physical analysis of water samples collected at Lake Glenville area sites help to characterize changes in water quality in relation to potential sources of water pollution. Overall water quality, as evidenced by sonde data collected in September 2016, October 2016, and July 2017, is acceptable but there is evidence to suggest the influence of seasonality on water quality. Results from future monitoring events can be evaluated individually and in relation to the results presented in this report to evaluate temporal changes in water quality and evaluate potential sources of pollution in Lake Glenville.

Results

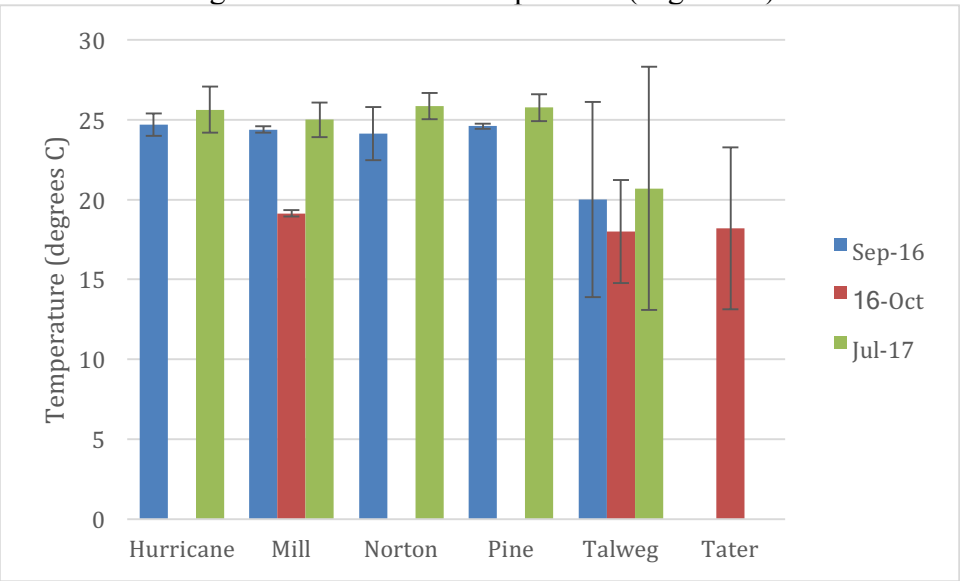
Average depth increased from September 2016 to July 2017 in Hurricane, Mill, and Pine Creeks. Average depth decreased from Septmeber 2016 to July 2017 in Norton and Talweg Creek. The extent of these depth changes in Tater Creek can not be discerned from the one sampling event in October 2016 (Figure 1).

Figure 1. Mean depth (100M)



Average water temperatures increased from September 2016 to July 2017 in all creeks except Tater Creek, which was only sampled once in October 2016. Increased water temperatures may contribute to decreased dissolved oxygen concentrations in these creeks. Mill and Talweg Creeks were the only creek sampled during October 2016 in addition to the other two sampling events, and showed a ~5^{o}C temperature decrease from the September 2016 average water temperature. (Figure 2).

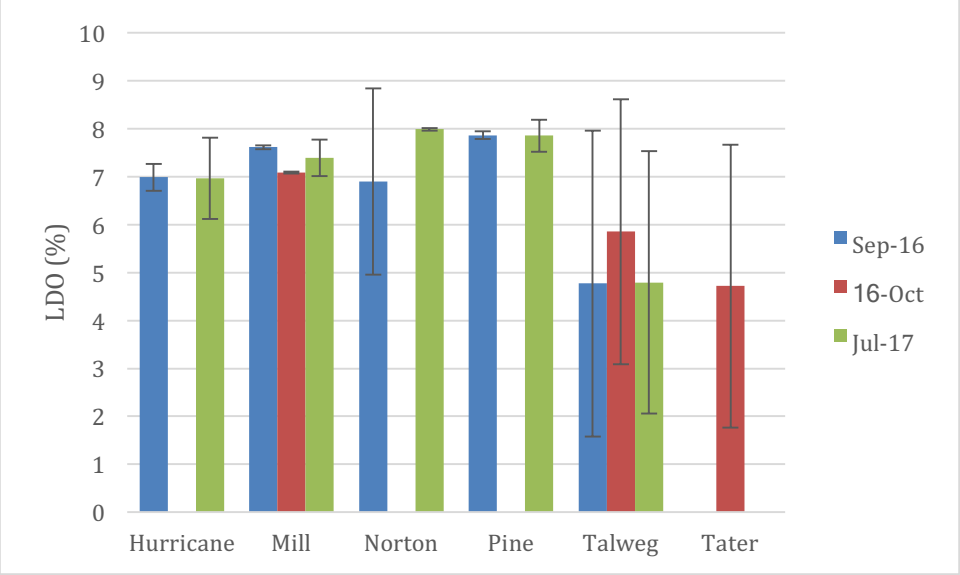
Figure 2. Mean water temperature (degrees C)



The North Carolina water quality standard (WQS) for dissolved oxygen to support freshwater aquatic life is >5mg/L. Average dissolved oxygen concentrations in September 2016 and July 2017 were fairly similar in Hurricane, Pine, and Talweg Creeks and were above the NC WQS. A slight decrease in dissolved oxygen concentration was observed during this time in Mill Creek while an increase was observed in Norton Creek. Talweg and Tater Creeks had lower average dissolved oxygen concentrations during all three sampling events compared to the other creeks and fell below the NC WQS for dissolved oxygen (Figure 3).

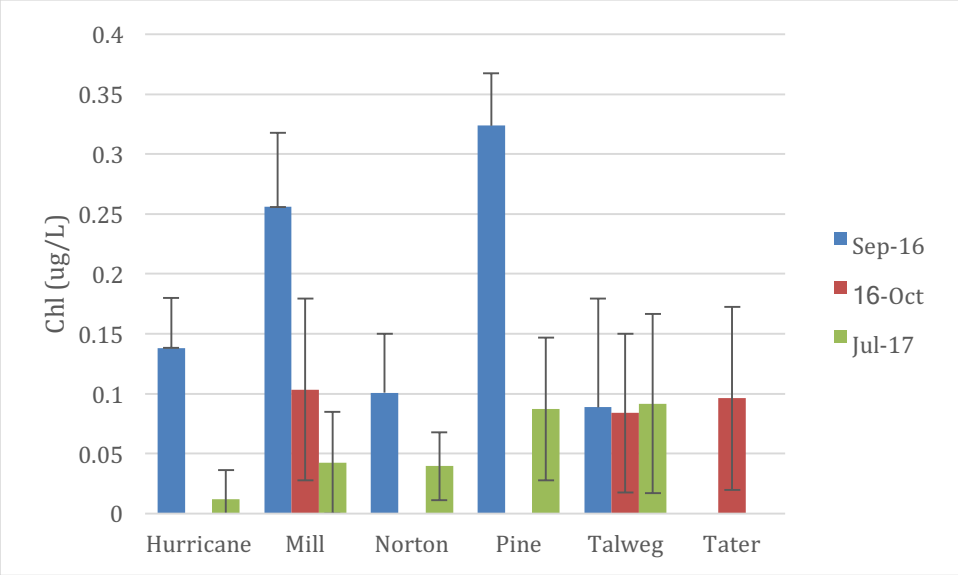
The observed dissolved oxygen concentrations in Talweg and Tater Creeks correspond to changes in water temperature as cold water will hold more dissolved gas compared to warm water. This observation may also be influenced by observed chlorophyll concentrations which are an indication of phyotosynthetic activity. Dissolved oxygen may become reduced or depleted as a result of abundant photosynthetic activity, which may be indicated by the relatively consistent chlorophyll concentrations in these creeks during the study period (Figure 4).

Figure 3. Mean dissolved oxygen (%)



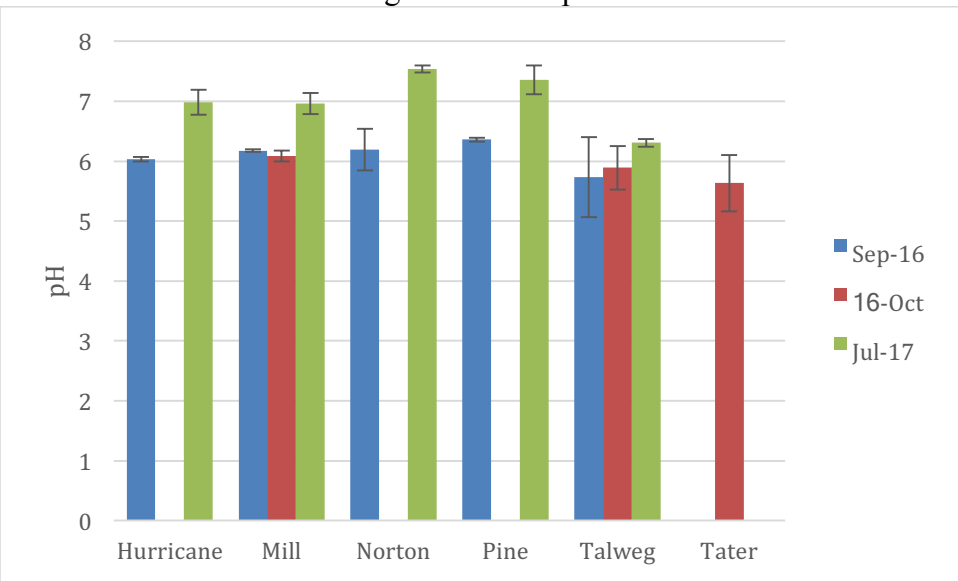
The NC WQS for chlorophyll-a to support freshwater aquatic life in waters subject to macroscopic and microscopic vegetation and designated as trout waters is 15µg/L. With the exception of Mill and Pine Creeks in September 2016, all creeks are below this WQS (Figure 4). The reduced water depth in Mill and Pine Creeks at this time may account for the elevated chlorophyll-a concentrations, as the reduced water depth allows for increased UV light penetration into the water column to support photosynthetic activity.

Figure 4. Mean chlorophyll concentration (µg/L)



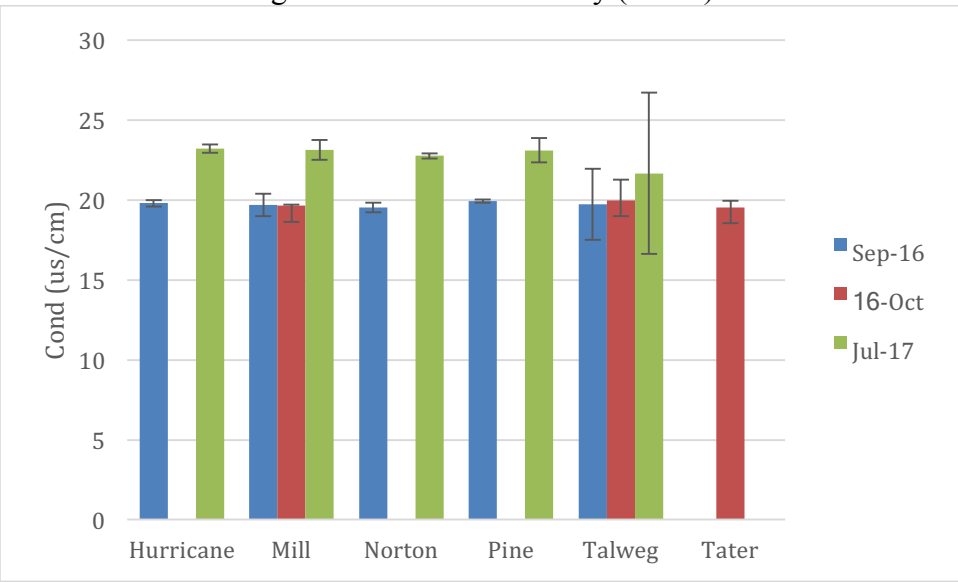
The ambient water quality standard for pH is between 6.0 and 9.0, although natural pH in area streams generally ranges from 6.5-7.2. Values below 6.5 may indicate the effects of acid precipitation or other acidic inputs, and values above 7.5 may indicate industrial discharge. All creeks monitored in September 2016 and October 2016 were observed to have an average pH below 6.5. With the exception of Talweg and Tater Creeks during 2016, all creeks were within the ambient water quality standard for pH during the sampling period (Figure 5).

Figure 5. Mean pH



Average conductivity concentrations increased in all creeks from September 2016 to July 2017. The observed conductivity levels at each monitoring site are relatively high considering the undisturbed forested landscape (Figure 6). The observed conductivity concentrations during this time correspond to increases in turbidity concentrations, suggesting that the conductivity concentrations may be affected by the input of runoff or eroded soils.

Figure 6. Mean conductivity (us/cm)



The NC WQS for turbidity in trout-designated waters is 10 NTU and the standard to protect other aquatic life is 50 NTU. Turbidity measurements in all creeks during all sampling periods are below the 10 NTU trout-designated water standard (Figure 7).

Figure 7. Mean turbidity (NTU)