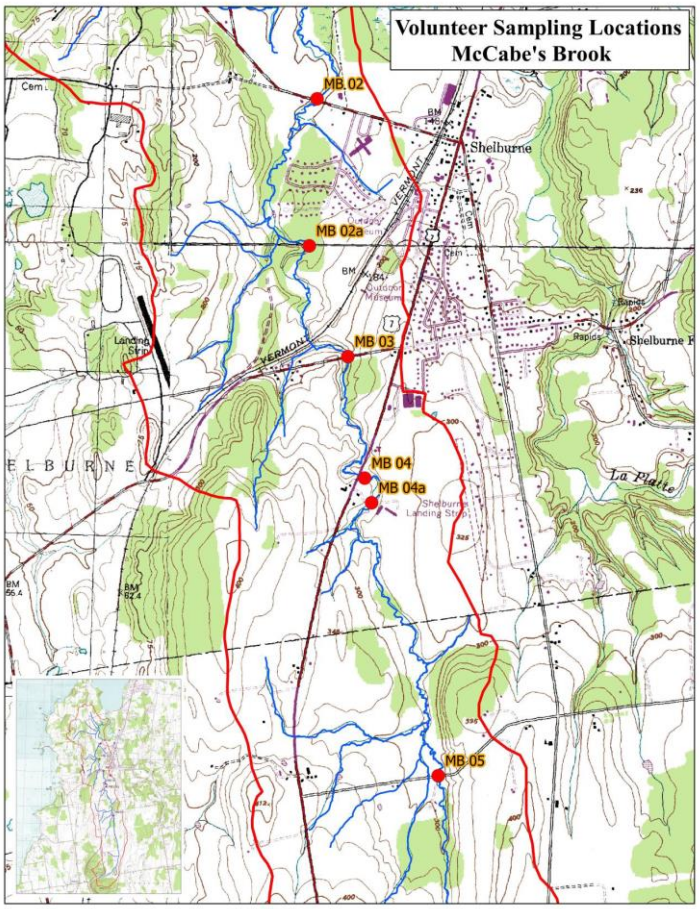
McCabe's Brook Watershed

Water Quality Summary 2016 (High Flow)
South Chittenden River Watch

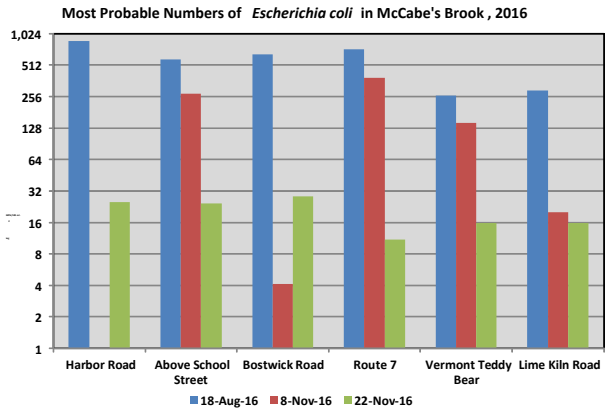


SCRW has been monitoring water quality in McCabe's Brook since 2011. In 2016, SCRW did a focus study on McCabe's Brook, and sampled additional stations to understand the landscape in better detail. Monitoring is also being conducted to track conditions of these waters with respect to Vermont Water Quality standards; and to estimate relative contributions of sediment and nutrients from each catchment to Lake Champlain in the context of the Lake Champlain Total Maximum Daily Load (TMDL) for phosphorus. Six different monitoring sites along McCabe's Brook define sub-watersheds in this catchment. In 2016, high-flow events were targeted to capture those times responsible for greatest loading to the lake. However, since calendar year 2016 was a below-normal precipitation year, and therefore flows in area rivers were below normal, it was a challenge to identify high-flow conditions for sampling. In the end, two moderate-flow events (August 18 and Nov 22) and one low-flow event (Nov 8) were captured.

Station	Town	Road Intersection
MB 02	Shelburne	Harbor Road
MB 02a	Shelburne	Above School Street
MB 03	Shelburne	Bostwick Road
MB 04	Shelburne	Route 7
MB 04a	Shelburne	Vermont Teddy Bear
MB 05	Charlotte	Lime Kiln Road

Escherichia coli

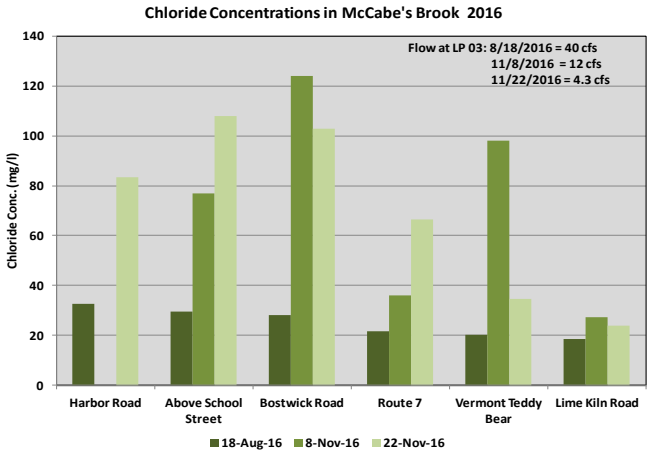
Six stations in McCabe's Brook were monitored for *E. coli*. Counts ranged from 4 to 866 MPN/100 mL. The mean of *E.coli* counts during the two moderate flow events (291 MPN/100 mL) was greater than the mean at low flow (166 MPN/100 mL), suggesting the importance of runoff-related sources of pathogens.



Vermont Water Quality Criteria (VTDEC, 2016) state that *E. coli* is not to exceed a geometric mean of 126 MPN/100mL obtained over a representative period of 60 days, and no more than 10% of samples should be above 235 MPN/100 mL (VWMD, 2016). During moderate flow conditions on August 18, as discharge was receding from a summer storm event, *E.coli* counts at all six McCabe's stations exceeded the health-based standard of 235 MPN/ 100 mL (Figure 3). This health-based standard was also exceeded during low, base-flow conditions on November 8 at stations MB04 and MB02a.

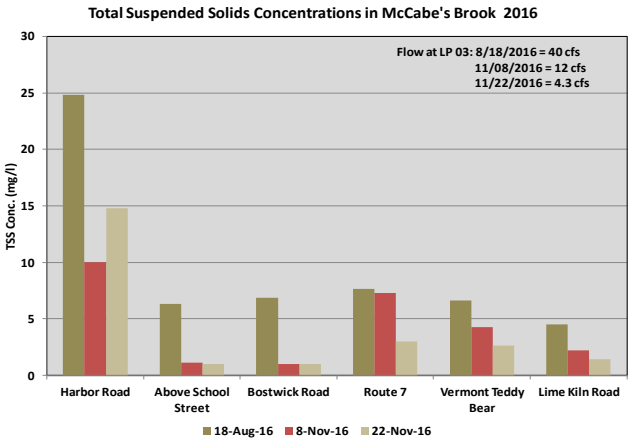
Chloride

Chloride concentrations were low, but increased somewhat between Route 7 and Harbor Road reflecting a small impact of urban drainage.

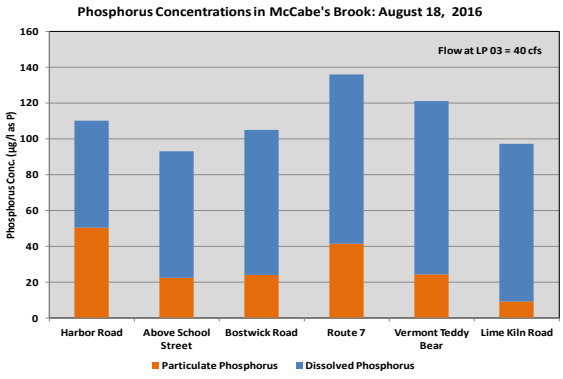


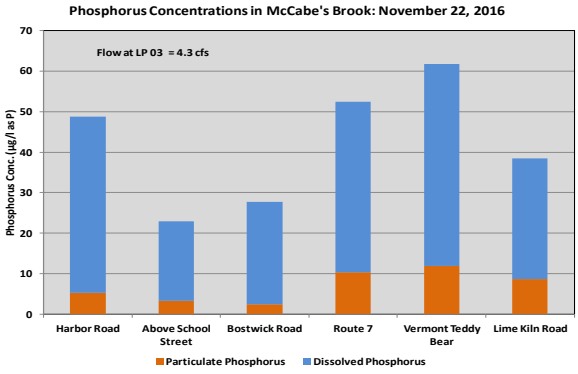
Suspended Sediment

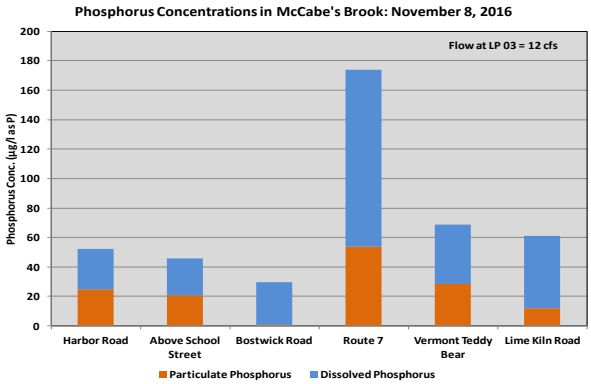
TSS (total suspended solids) ranged from <2 to 25 mg/L. TSS was generally somewhat higher in concentration during the moderate flow events (August 18, Nov 22) than during the low-flow event (Nov 8). Highest TSS concentrations were detected at Harbor Road during moderate flows.



Phosphorus







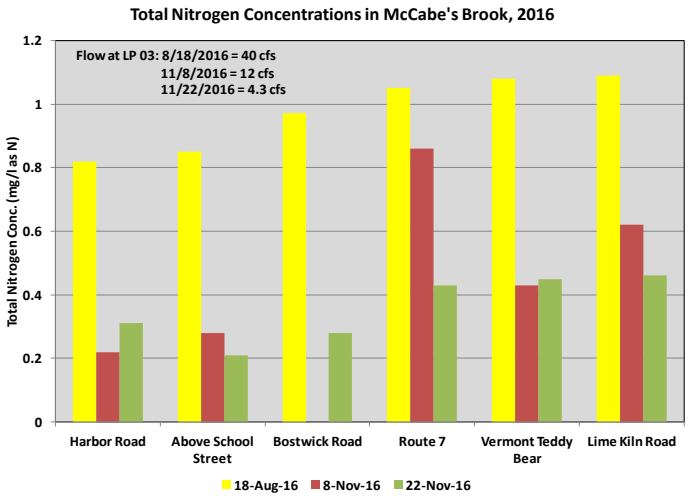
Higher concentrations of total phosphorus were detected between stations MB05 and MB04. Phosphorus consistently peaked around Route 7, then decreased at Bostwick Rd (losing stream), then increased steadily to Harbor Rd. This is in line with historic trend.

TP ranged from 23 to 170 µg/L. The instream phosphorus criterion of 27 µg/L for warm-water medium gradient (WWMG) wadeable stream ecotypes in Class B waters is applicable at low median monthly (LMM) flow conditions during June through October (VWMD, 2016). Only the November 8 sampling event was classified as a low flow, where daily mean flow measured at Shelburne Falls on the LaPlatte River (6.2 cfs) was nearly at the LMM (5 cfs) (Table A-1). TP concentrations on this date exceeded 27 µg/L at all sampling stations in SCRW watersheds.

Generally speaking, highest DP as a percentage of TP was reported for McCabe's Brook and Kimball Brook. Elevated DP as a percentage of TP tended to be coincident with low or nondetectable Total Suspended Solids.

Nitrogen

Total Nitrogen (TN) was analyzed during each event at all stations, and ranged from 0.2 to 1.1 mg/L. Given elevated nitrogen concentrations detected historically, all stations were also tested for nitrate and nitrite forms of nitrogen (N03-N02). Nitrate-nitrite concentrations ranged from <0.05 to 0.8 mg/L. TN and N03-N02 concentrations on these low-flow and moderate-flow sample dates were well below the water quality standard for Class B water of 5.0 mg/L as nitrate-N (which applies at flows exceeding LMM; VTWMD, 2016). TN levels were consistently lower than 2015 levels, with the exception of Route 7, which was higher than 2015.



Conclusions and Recommendations

Due to weather conditions that resulted in lower-than-normal stream flows, SCRW was unable to monitor high-flow conditions on McCabe's Brook in 2016.

- Though the focus study on McCabe's Brook is over, the school street neighborhood should remain bracketed next sampling season, and should be addressed through BMP's to mitigate stormwater
- Agricultural drainage needs to be addressed upstream, and urban drainage downstream
- Outside chloride impacts are likely, peaking at Bostwick Rd, perhaps due to an influx at groundwater at this location, and road salt in the urban downstream section
- Suspended sediment increased moving downstream, likely due to stormwater pipes entering McCabe's Brook at Harbor Rd and causing bottom scour; this location is a "hot spot"
- Priority should be given to projects, such as the floodplain encroachment hot spot area adjacent to Route 7, to relieve exacerbating mass failure conditions in the stream that degrade flow characteristics, stream equilibrium conditions and water quality.

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