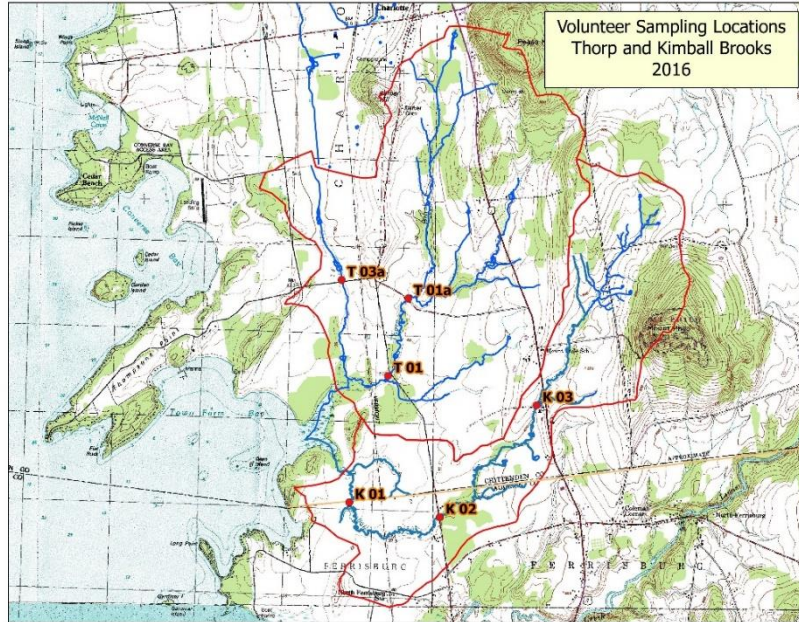


Thorp and Kimball Brook Watersheds
 Water Quality Summary 2016
 South Chittenden River Watch

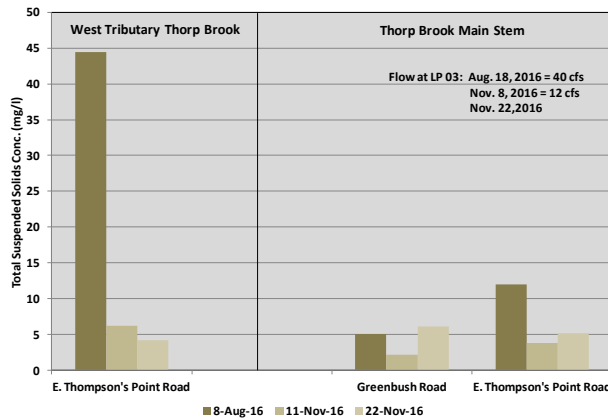
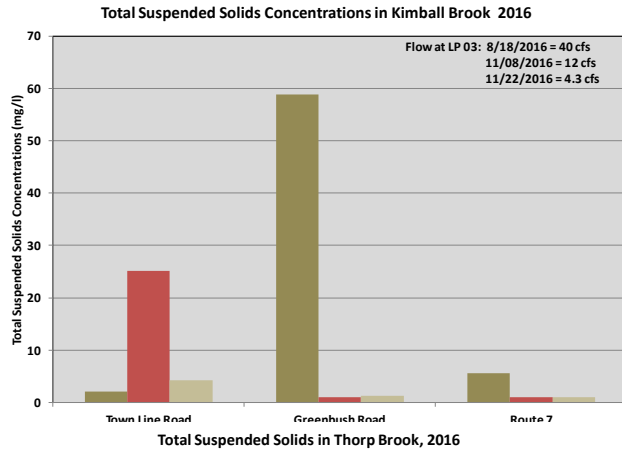
SCRW has been monitoring water quality in Thorp and Kimball Brooks since 2011. Based on early monitoring results, the lower 1.1 miles of Kimball Brook were listed by the State of Vermont as stressed waters with impacts to aquatic health, aesthetics and secondary contact recreation uses resulting from development, channelization and agricultural land uses (VTDEC, 2016b). In 2016, SCRW established additional stations on the



both the Kimball and Thorp Brooks to bracket potential “hot spots” of sediment and nutrients. 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 Thorp and Kimball Brooks define sub-watersheds in these two catchments. 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
T 01	Charlotte	Greenbush Road
T 01a	Charlotte	E. Thompson’s Point Road
T 03a	Charlotte	Thompson’s Point Road
K 01	Ferrisburgh	Town Line Road
K 02	Ferrisburgh	Greenbush Road
K 03	Charlotte	Route 7 and Claflin Farm

Suspended Sediment



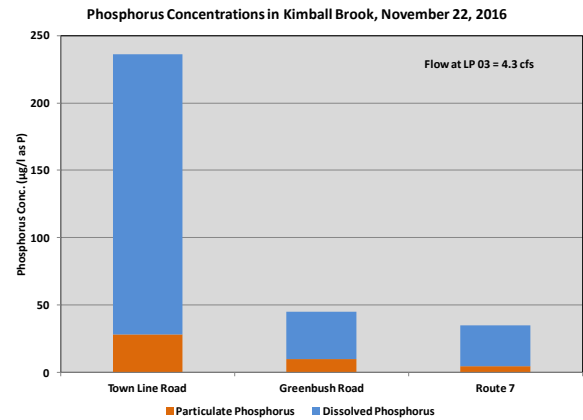
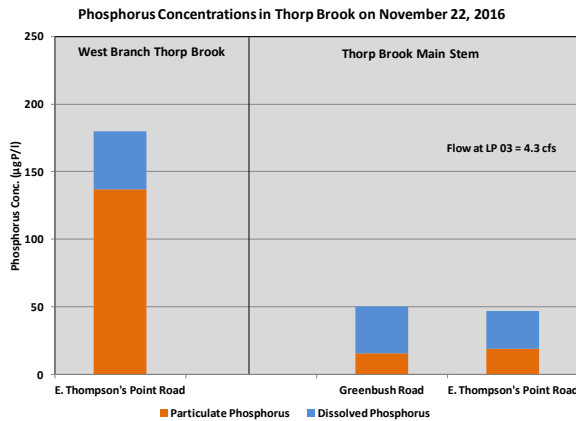
TSS was analyzed during each event at all stations and ranged from <1 to 59 mg/L. TSS was generally somewhat higher in concentration during the moderate flow events (August 18, Nov 22) than during the low-flow event (Nov 8). Highest TSS concentrations were detected in Thorp Brook (T03a) and Kimball Brook (K02) during the August 18 storm event.

TSS concentrations spiked in Kimball Brook at Greenbush Road to a level of 58.8 mg/l during the moderate flow event,

TSS concentrations were generally higher in the western tributary to Thorp Brook than in the main stem. Suspended solids concentrations decreased significantly from previous sampling years, though this could be attributed to lower flow conditions

Phosphorus

Thorp and Kimball sites were tested for both Total phosphorus (TP) and dissolved phosphorus (DP). Particulate phosphorus was estimated as the difference between TP and DP. TP patterns detected in Thorp and Kimball watersheds suggest an increasing concentration with distance downstream, although stations are few in number.



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) TP concentrations on this date exceeded 27 µg/L at all sampling stations in Thorp and Kimball watersheds.

During all three events, TP concentrations increased substantially between K02 (Greenbush Rd) and K01 (Town Line Road). DP represented a large percentage of the TP concentration during the two moderate-flow events at site K01, while at the same time suspended sediment concentrations were not particularly elevated. These results suggest the contribution of a dissolved P source(s) between these two stations.

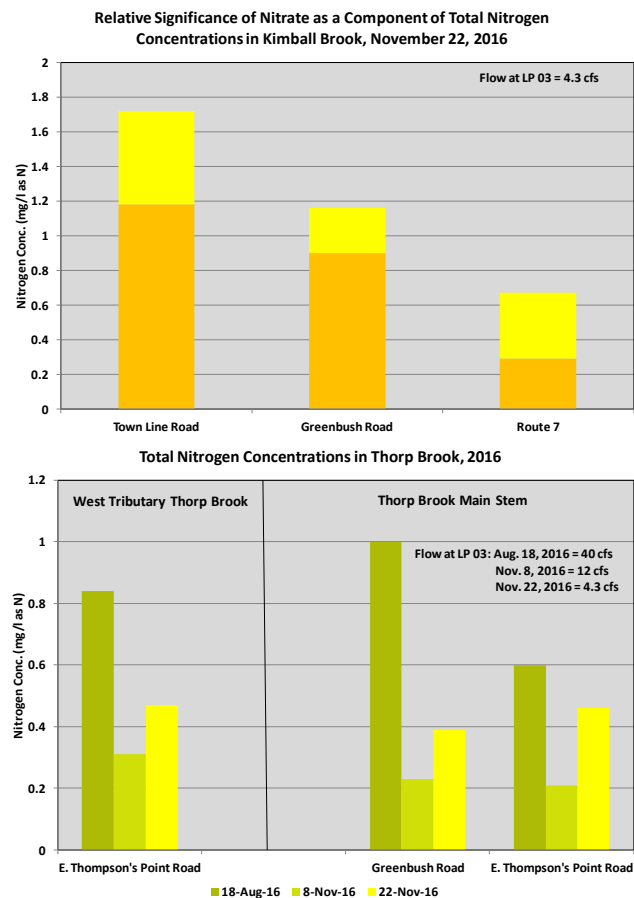
. Phosphorus was predominantly in dissolved form when flows were low and concentrations of suspended solids were low or nondetectable. TP average was lower than the past three years.

Nitrogen

Total Nitrogen (TN) was analyzed during each event at all stations, and ranged from 0.2 to 2.6 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 1.2 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 waters of 5.0 mg/L as nitrate-N (which applies at flows exceeding LMM; VTWMD, 2016).

N03-N02 forms of nitrogen were detected primarily in the Kimball Brook stations on moderate flow dates (Aug 18, Nov 22).

Median TN concentrations in 2016 were lower than historically sampled. This could be due to lower flows,.



Conclusions

Due to weather conditions that resulted in lower-than-normal stream flows, SCRW was unable to monitor high-flow conditions on the Thorp and Kimball Brooks in 2016.

Total phosphorus concentrations during the one low-flow event were elevated above instream phosphorus standards at all six stations on the Thorp and Kimball Brooks. These results suggest that the length of waters considered stressed due to impacts from development, channelization and agricultural land uses may extend farther than 1.1 mile upstream on the Kimball Brook, and that a xx-mile length of the Thorp Brook should also be considered for listing as a stressed water.

A potential “hot spot” of dissolved phosphorus contribution between Kimball Brook stations K02 and K01 was revealed by moderate-flow sampling results.

Additional monitoring stations are needed to further bracket potential sources of sediment and nutrients along Thorp and Kimball Brooks, and to measure the contribution from major tributaries.

Future Activities

- In the Thorp Brook and its tributaries, three new monitoring stations have been established just upstream of station, T01a, to further refine spatial trends and bracket three watershed improvement practices recently, or about to be, implemented by stakeholders. These projects have been identified as part of the “Ahead of the Storm” project and will address water quality stressors including pathogens, sediments and nutrients, as well as concentrated stormwater runoff. These new stations were monitored for sediment and nutrients during high flows in 2017, and will continue to be monitored in 2018.
- SCRW is working with partners to discuss further bracketing and/or BMPs between K02 and K01

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