

Thorp, Kimball, and Holmes Brooks

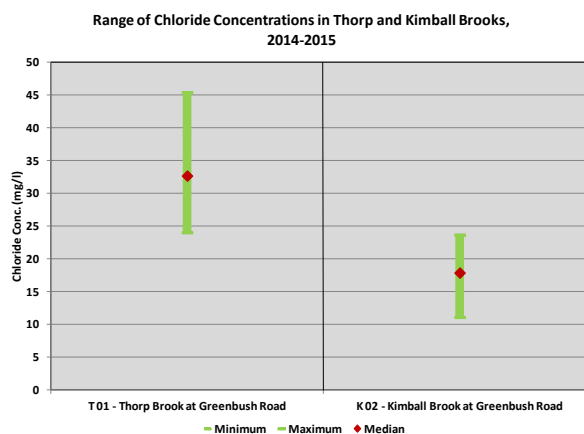
2015 Water Quality Summary

South Chittenden River Watch

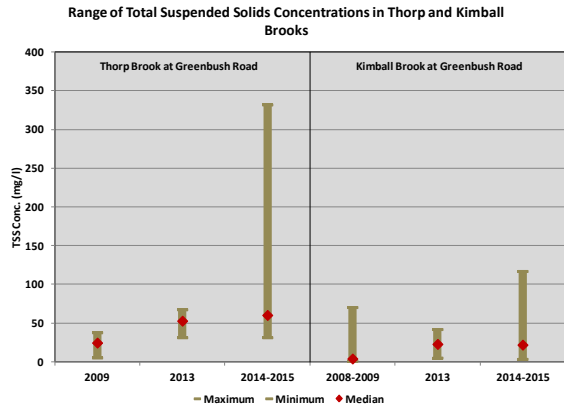
Thorp and Kimball Brook water quality monitoring in 2015 took place at sentinel stations to monitor long-term trends of these two direct-to-lake watersheds. One monitoring site is on Thorp Brook at Greenbush Road, and one site is on Kimball Brook at Greenbush Road. Samples were not collected on Holmes Brook in 2015, but historic data results will be included, as future sampling of Holmes Brook is anticipated. Samples were collected on seven dates throughout the spring and summer. All but one sampling day (October 1) was considered high flow sampling conditions. Targeting high flows was based on rainfall forecasts, rainfall at the Shelburne Waste Treatment Facility, and LaPlatte River discharge rates of >75 cubic feet per second at Falls Road. The VT DEC LaRosa Program performed all lab services, and worked with SCRW to ensure that all work was in accordance with a joint EPA approved Quality Assurance Plan. All QA approved data were entered into the State and EPA Storet database.

Only high flow data were used for several reasons. First, high flow events lead to more sediment and nutrient loading in Shelburne Bay and Lake Champlain. Second, sampling only high flow events over multiple years makes for results that are more comparable. Third, high flows enhance the sensitivity of results to impacts affecting water quality and specific characteristics of the watershed. Lastly, high flow events provide more complete data on the influence of upstream flows on the entire stream, whereas low and moderate flows are highly variable and are therefore not an accurate depiction of the whole system. It is important to note that water quality results taken at high flow rates are not comparable to results from past years taken at random flow rates.

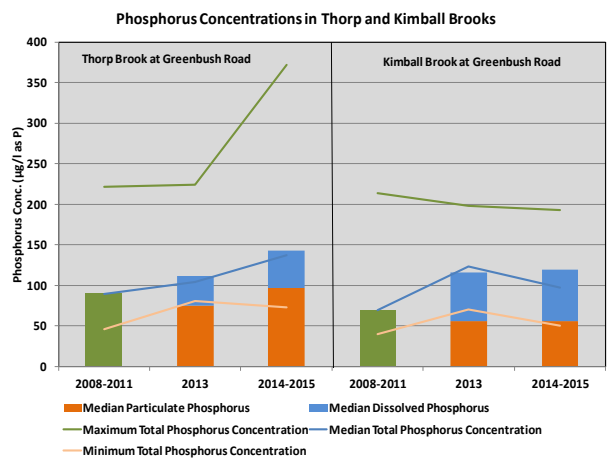
Chloride analysis was initiated in 2013, with no significant changes in concentrations among years. Chloride occurs in animal waste and road salts. A stream with natural levels of chloride that is unaffected by outside sources will range between 10 and 20 mg/l of chloride. Chloride levels in Thorp and Kimball Brooks were low and close to background levels. The sampling location on Kimball Brook is located upstream from Greenbush Road, and is therefore not affected by drainage from the roadway. Chloride concentrations downstream from Greenbush Road in Thorp Brook were slightly higher, suggesting the effect of road drainage.



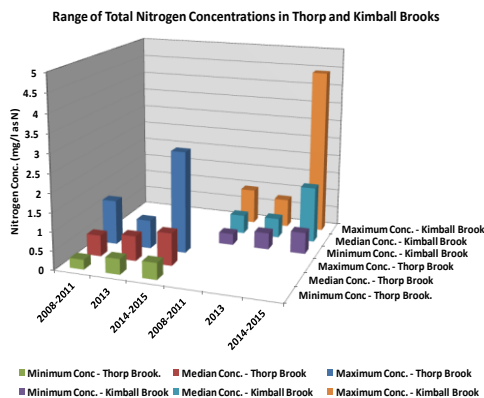
Suspended Sediment levels at both sampling locations were higher than in previous years, reflecting the difference in methods from random flow sampling to high flow sampling. Considering the shift in sampling regime, levels of solids in Kimball Brook were generally low, reflecting its forested surroundings just upstream from Greenbush Road. Agricultural land use impacts downstream of K2 are not captured. Thorp Brook at T1, which is downstream from Greenbush Road, had higher levels of suspended sediment, reflecting the impact of runoff from Greenbush Road and upstream land uses such as East Thompson's Point Road and agricultural fields. Holmes Brook and its main tributary had increased solids levels compared to previous years, measured in turbidity, during its most recent sampling in 2013. Holmes Brook drains agricultural land, which likely explains this.



Phosphorus concentrations in Kimball Brook were generally higher in 2013 and 2014-2015 than in previous years, again reflecting the higher flow rates sampled during these years. Unlike most other streams being monitored, the levels of dissolved phosphorus tended to exceed those of particulate phosphorus. This high ratio is likely due to runoff and leachate from decaying organic matter from the forested area immediately upstream from Greenbush Road. Phosphorus levels at Thorp Brook were higher than Kimball Brook, upstream land use differences. Holmes Brook has historically had consistent phosphorus concentrations over the years, with dissolved phosphorus predominating over particulate phosphorus. This reflects manure runoff impacting stream water quality.



Nitrogen concentrations rose dramatically in 2014-2015 compared to previous years. In particular, both streams had spikes of maximum nitrogen concentrations. Nitrogen levels were higher than would be expected in waters unaffected by runoff and animal wastes.

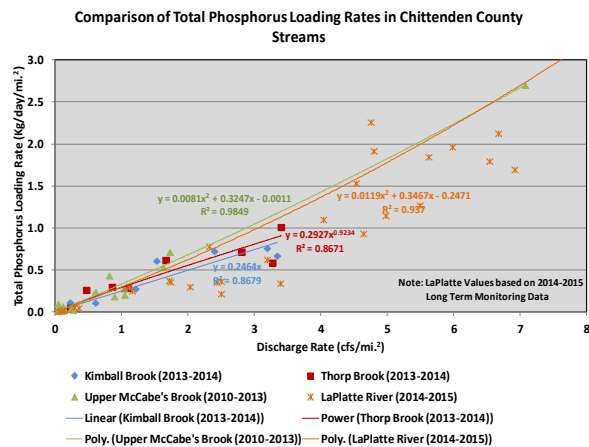


Kimball Brook had high values for total nitrogen and nitrate plus nitrite, though these values are below the Vermont standard. Potential nitrogen sources include leachate from decaying organic matter in the forested area immediately upstream from Greenbush Road, and high flows bringing increased nitrogen from upstream. Since both nitrogen and phosphorus values are high in Kimball Brook, resuming focus monitoring of the

Kimball Brook watershed should be considered. Nitrogen levels in Thorp Brook were lower than Kimball Brook, with occasional high readings. Nitrogen levels in the Holmes Brook southern tributary were higher than Holmes Brook itself in 2013, reflecting the history of agriculture.

Loading Rates provide a useful interpretive tool for understanding sources of nutrients and for the comparisons among watersheds as sources of nutrients. Loading rates can be calculated by measuring discharge rates. Discharge rates were measured in Thorp and Kimball Brooks in 2013 and 2014. Particulate and dissolved phosphorus loading rates in Thorp and Kimball Brooks reflected the sources of phosphorus entering the streams: road and farm field runoff discharging sediment to Thorp Brook, and leachate in runoff from forested land discharging dissolved phosphorus to Kimball Brook.

Total phosphorus loadings in Thorp and Kimball Brooks were similar, and can be compared to loadings from upper McCabe's Brook, which is strongly influenced by agriculture, and the LaPlatte River. Loading rates in upper McCabe's Brook were somewhat higher and increased at a greater rate as the discharge rate increased, as would be expected given the impact of agriculture. Loading rates in the LaPlatte River were high variable but resembled those in upper McCabe's Brook.



Recommendations and Follow-up Actions

Kimball Brook

- Consider re-establishing a focus watershed-wide sampling plan to enhance understanding of nutrient sources in the lower Kimball Brook, especially impacting stations K 01 and K 03

Thorp Brook

- Consider re-establishing wider watershed sampling plan to enhance understanding of nutrient sources, especially impacting the west branch of Thorp Brook and the upper Thorp Brook main stem

Holmes Brook

- Consider forming a sampling plan for the large north-south tributary that discharges to a public beach.

The South Chittenden River Watch is funded in part by the Towns of Shelburne and Charlotte. The 2015 SCRW team included: Bill Hoadley, Susan Moegenburg, Thomas Newcomb, Ross Doree, Judy Raven, Bob Hyams, Myra Handy, Joannah Ralston, Ray Mainer, Ed Sengle, Jon Trefry, Andrea Morgante and Marty Illick.

For more information, contact Marty Illick at 425 2002 or see www.lewis creek.org.