

Item 6Gi.
BCWMC 5-17-18

DATE: 16 April 2018

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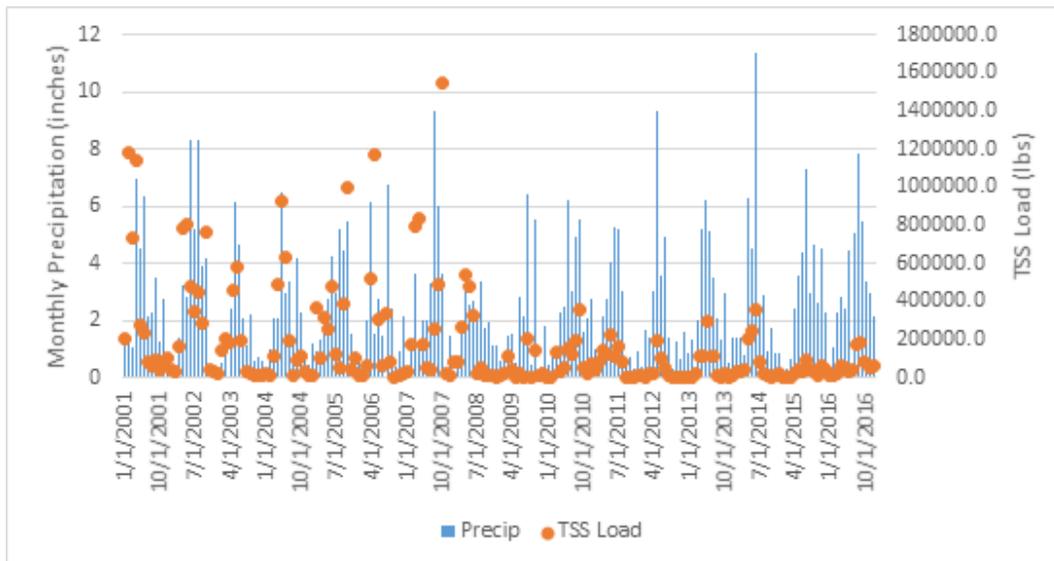
SUBJECT: Bassett Creek TSS Load Estimate Reduction

On March 26th, 2018 Barr Engineering (Barr) contacted the Metropolitan Council (Council) to follow-up on an analysis they had performed on Bassett Creek loading data. Specifically, they stated:

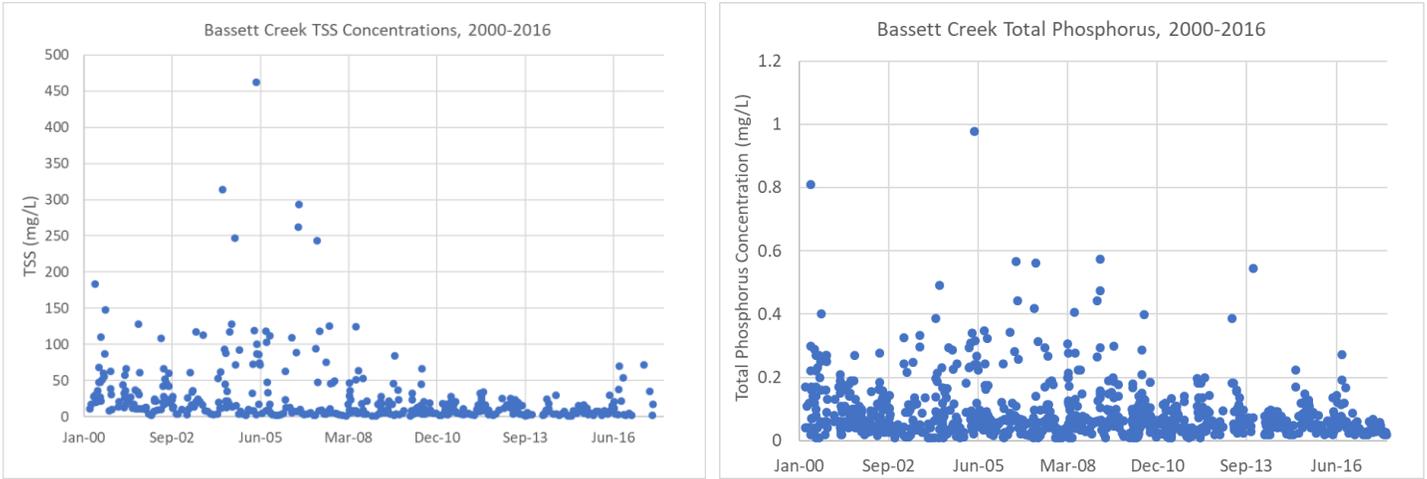
“One thing we noticed is that there appears to be a significant drop in the TSS load estimated by the WOMP data after 2009, but we don’t see a similar drop in flow or TP. We wanted to follow-up with you regarding this to see if there was a change in the monitoring and/or FLUX modeling protocol around that time that could explain the reduced estimate of TSS load, which can be a tricky parameter to monitor. I know the BCWMC/member cities have implemented several creek restoration/stabilization projects in the past decade+ but I am not sure we would have expected this level of reduction.”

Embedded in the email was a table and plot illustrating their point.

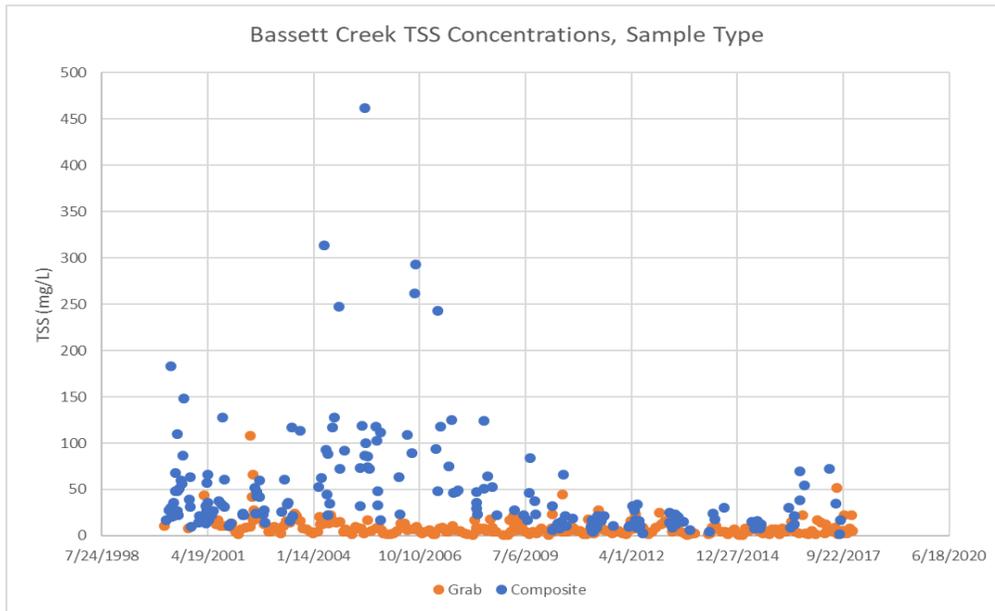
Summary Statistics Monthly TSS Load (lbs)	Min	Max	Average
2001-2008	4,239.3	1,547,499.9	263,424.4
2009-2016	1,601.1	358,169.2	65,828.4
Whole Record (2001-2016)	1,601.1	1,547,499.9	164,626.4



Council staff quickly confirmed that sampling, laboratory analysis, or load estimation methodology had not changed between 2001-2009 and 2009-2016. However, we decided to investigate further to understand what may be happening with TSS in the watershed. First, Council staff evaluated the TSS and TP concentrations over the period of record. Generally, sampled concentrations have followed the loads, having decreased over the past 10 years. This signal is more apparent in TSS than TP:



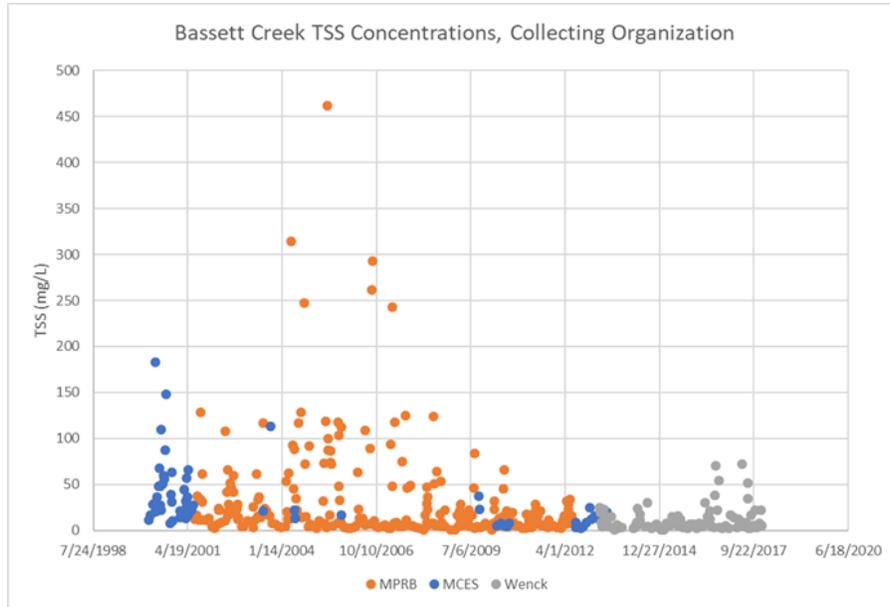
Council staff also investigated sampling method, grab vs. composite. Not surprisingly, the storm event samples (composites) generally have the larger TSS concentrations when compared to baseflow grab samples. Descriptive statistics confirmed this visual observation as well.



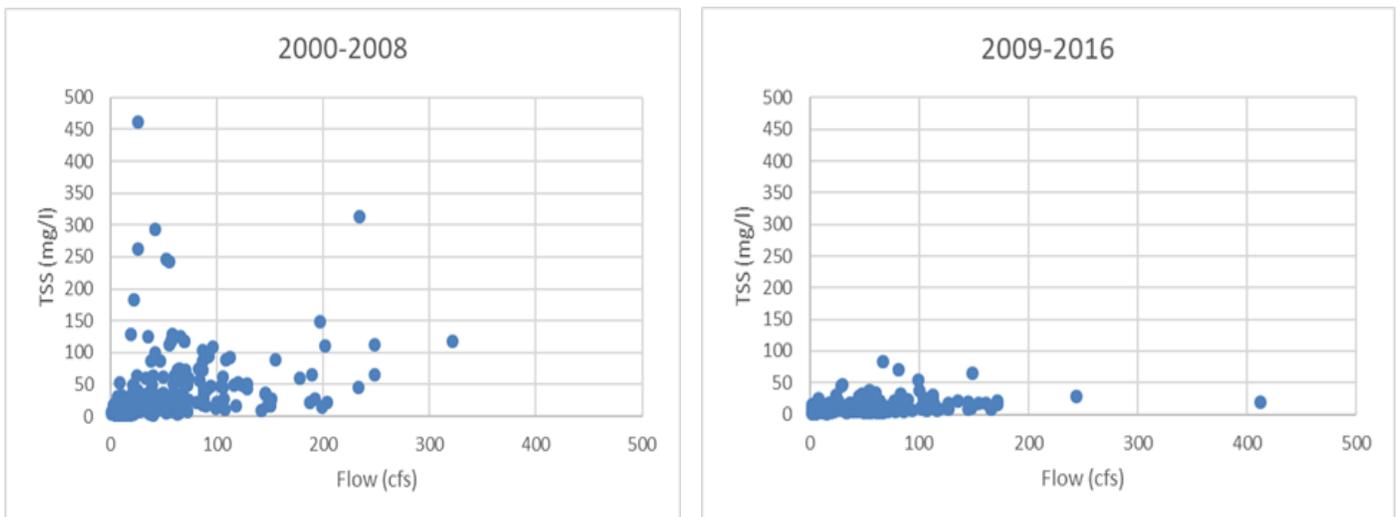
	Median TSS (mg/L)	Mean TSS (mg/L)
All Samples	11	26
2000-2008 Grab Samples	8	11
2009-2016 Grab Samples	5.5	7.3
2000-2008 Composite Samples	48	69
2009-2016 Composite Samples	16	20

Council staff also investigated sampling cross section and which cooperators/collectors collected samples over the period. MPRB staff collected samples before, during and after the time period in which TSS load changed. It is not likely that a change in cooperator/collector caused the change in TSS load.

The right bank collection point has been consistent since sampling began in 2000.



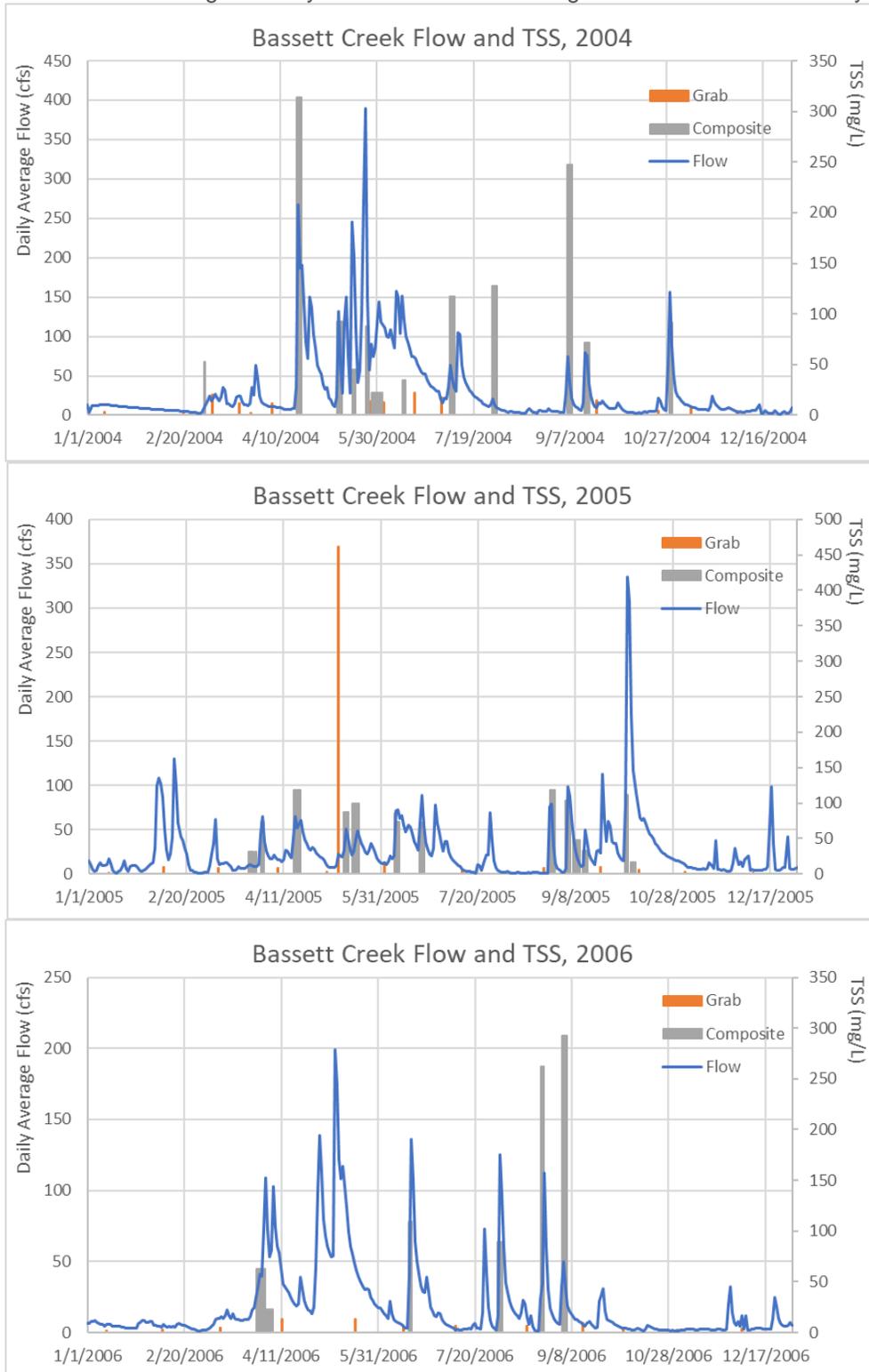
Council staff wanted to see if the sampling regime had changed which might influence the results. The following concentration vs. sample flow plots are useful for this, divided into “before 2009” and “2009 and after”:

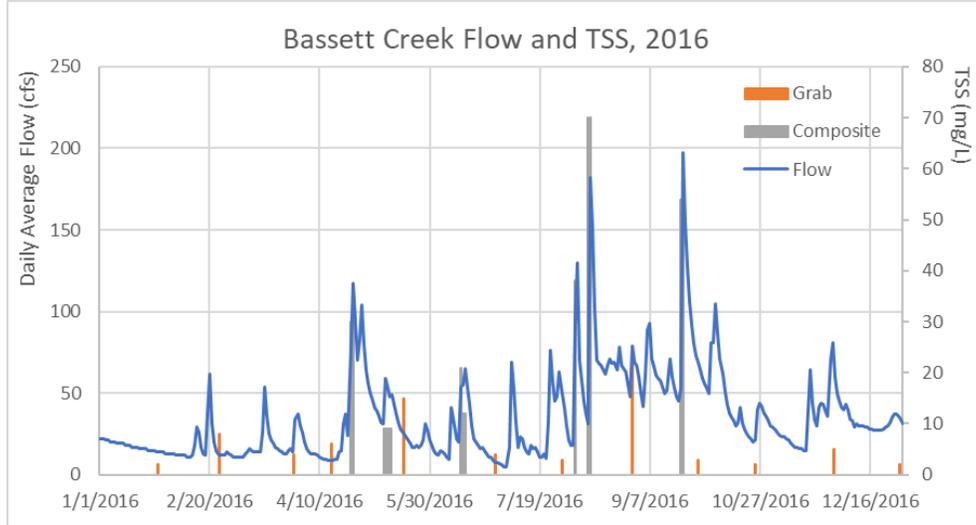
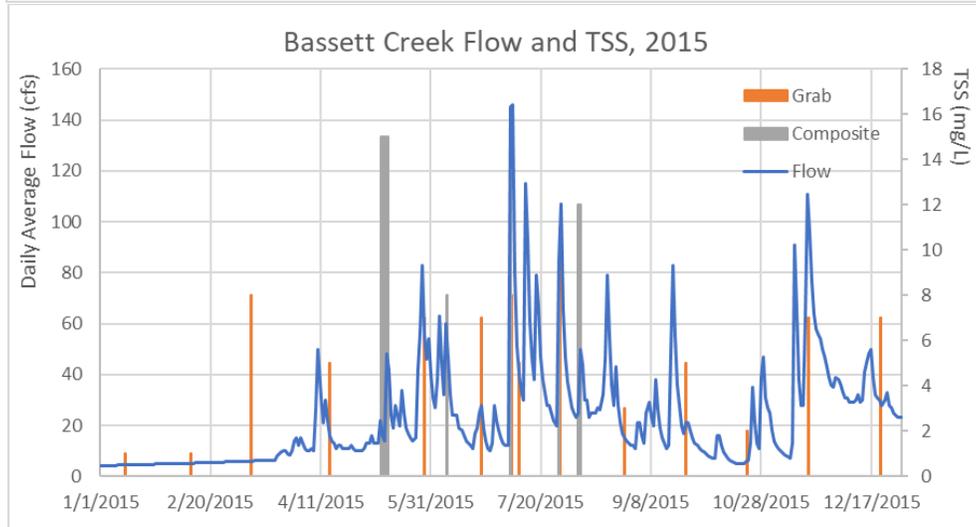
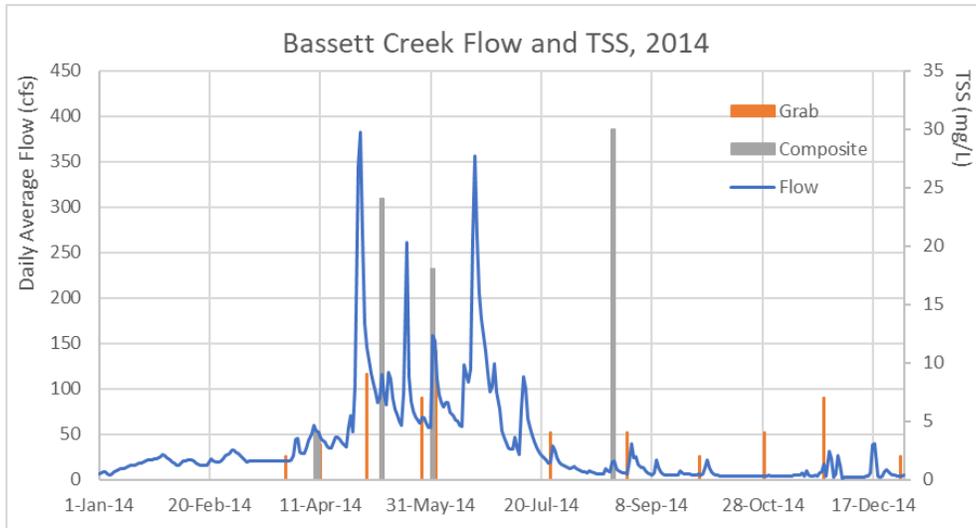


In the past, Bassett Creek had a few more samples between 200-300 cfs, but mostly our samples are between 0-200 cfs for both time periods, but peak concentrations are much lower.

There weren't any changes in the intake line location to explain those “fixed” or composite values showing the change. One possible explanation for the reduced concentrations in later years could be that the composites were biased lower due to more frequent falling limb coverage of the compositing or a general increase in duration to dilute the concentration a bit.

To address this concern, Council staff did a comparison of sampling durations between two periods, ten years apart, 2004-2006 (higher TSS concentrations) and 2014-2016 (lower concentrations). We decided that identifying whether samples were on the rising limb only vs. entire event or falling limb would also be visually helpful.





Generally, MCES and our cooperators sampled the rising limb on most storms, in most years (2014 was a bit spotty). This analysis shows that we do not have the same response in TSS concentrations to storm events in the

most recent decade, please note the differences in scale of the TSS concentration axis on the right of the graphs (by an order of magnitude).

Barring an unaccounted mechanism driving this pattern in TSS concentrations, ***Council staff believe that these data show a documented improvement in water quality for Bassett Creek.***

However, Staff can recommend additional analyses if Barr wants to investigate further:

- Peak Flow Analysis
- Use 15 Minute Flow Data, instead of daily average flows

Please feel free to contact Jen Kostrzewski or Casandra Champion if you have questions or concerns about this information.