



MEMORANDUM

TO: Mike Isensee, MSCWMO

FROM: Matt Downing, WCD

DATE: 1/19/2017

RE: **2016 Perro Pond/Creek Targeted Monitoring Summary**

In 2016 monitoring of Perro Creek was undertaken to identify where the greatest contribution to the Saint Croix River was occurring. Automated data loggers were installed at the outlets of Perro Pond to Perro Creek and the direct pipe to the Saint Croix, and at the Perro Creek diversion structure in the main channel and the overflow pipe. Grab samples were collected at these sites and analyzed for Total Phosphorus (TP), Total Kjeldhal Nitrogen (TKN), Total Suspended Solids (TSS) and *E. coli*. Additionally, samples were collected at the historic 6th Street monitoring location for *E. coli* only. While the data collected from this study is far from conclusive and an additional year should be conducted to make the results more robust, listed below are some of the observations that can be made to date:

- Water quality was confirmed to be similar from multiple outlets from Perro Pond. It can be assumed that future samples taken at one location are representative for both locations (Perro Pond Outlet and Perro Pond Outlet Direct)
- TP and TSS concentrations observed leaving Perro Pond were very low and are at acceptable levels for maintaining good water quality. Also, no storm pulses of any significance were recorded leaving Perro Pond. Considering that 2016 was the wettest year on record (according to the National Weather Service), it may be assumed that under no set of current conditions would Perro Pond be a source of significant nutrient loading to the St. Croix and would not benefit from retrofits (when talking about downstream water quality, not in-pond water quality as that was outside the scope of this study)
- Roughly three times as much discharge was logged at the diversion structure than the main outlet, which is likely under represented with much shorter logged data interval at the diversion. This information, coupled with no logged storm events at the main outlet, indicate that the vast majority of the contribution to the creek is occurring from sources in the town of Bayport. Field observations also indicate that in addition to storm runoff being a major source, some other non-event contribution occurs on a regular basis as no flow or dry conditions were observed at the outlet and 6th street locations but next to normal flow was occurring at the diversion site. Groundwater contribution is the most likely source, but water quality sample results do not necessarily support this theory.
 - *E. coli* results tended to be near impairment levels at the outlet site, generally dropped by the 6th street location and then increased again by the diversion site. These results seem to indicate that a source high in *E. coli* exists somewhere between 6th street and the diversion structure (unsupportive of groundwater contribution).
 - Average phosphorus concentration increases from the outlet to the diversion structure as expected, but the observed range of samples taken reaches lower values at this location during non-event periods (supportive of groundwater contribution)
- Table 1 and 2 summarize these findings:

Table 1. 2016 Water Quality and Discharge Summary

Site	Date Range (2016)	Estimated Discharge (CFS)	Estimated Discharge (ac-ft)	Average Phosphorus Concentration (mg/L)	Phosphorus Range (mg/L)	Average TSS Concentration (mg/L)	TSS Range
Perro Direct	5/24-8/20, 8/26-8/30, 9/7-11/3	6,166,950	141.65	0.074	0.044 - 0.097	5	1 - 13
Perro Out	4/28-10/16	32,534,800	747.29	0.074	0.020 - 0.259	6	1 - 24
Perro Diversion Main	5/5-5/14, 5/30-6/5, 6/9-7/10, 7/13-8/12, 9/12-9/27	99,341,000	2281.75	0.105	0.023 - 0.326	36	1 - 112
Perro Diversion Overflow	4/26-7/8, 7/29-8/20, 8/31-10/17, 10/12-11/3	2,162,030	49.66	Assume as main	Assume as main	Assume as main	Assume as main







Table 2. 2016 Perro Creek *E. coli* Sample Results Summary

Site	<i>E. coli</i> Results						
	5/11/2016	6/2/2016	6/9/2016	7/21/2016	8/24/2016	9/6/2016	10/17/2016
Outlet	131	20	147	172	194	185	50
6th street	24	96	37	dry	185	>2420	40
Diversion Structure	32	62	816	1553	194	>2420	84

Additional monitoring is planned for 2017 to further refine these observations and correct a number of issues encountered in 2016. An unexpected frequency of undocumented manipulation of the outlet to the creek made analysis of flow data problematic and hindered automated sample collection. In 2017 we seek to establish a better working relationship with City of Bayport Public Works staff to address these issues. There were also many issues collecting reliable data at the main channel of the diversion structure due to the placement of the area velocity sensor and the propensity of the v-notch weir just upstream to become obstructed with debris. This condition hampered reliable data collection and flow estimation. In 2017 a new location for the sensor will be identified to attempt to address these issues. Finally, a number of issues with equipment reliability were encountered over the course of the season causing periods of missing data. Steps will be taken to remedy this issue in 2017.

2016 MSCWMO Perro Creek Targeted Monitoring

KEY TO FEATURES

- Perro Creek Monitoring Sites**
-  Continuous Flow Monitoring and Water Quality Samples
 -  E. coli Grab Samples Only
 -  Perro Creek Catchment
 -  Perro Creek
 -  Streets
 -  Railroads

