

Results of Storm Water Quality Sampling around Arboretum Creek in December, 2019:

FOAC Technical Memorandum #4¹

-- Dave Galvin 1/8/2020

SUMMARY:

Friends of Arboretum Creek (FOAC) sampled three sites during the intense rainstorm of December 20, 2019: two of the sites represented direct stormwater runoff from Lake Washington Blvd. at curb cuts in the southern portion of the Arboretum; the third site was of the main Arboretum Creek just upstream (south) of the Wilcox Bridge in the northern portion of the Arboretum. Samples were only analyzed for diesel and lube-oil organics, to check for stormwater runoff contaminant levels during the storm event. Detections of both organic measures in both curb cut samples confirmed stormwater contamination from the blvd. Levels in the main creek downstream were below detection, as a result of dilution from other, non-roadway runoff within the Arboretum drainage.

BACKGROUND:

Friends of Arboretum Creek intends to document water quality issues related to Arboretum Creek as well as inputs to the creek and adjacent potential water sources, in order to better evaluation options for enhancing flows into Arboretum Creek in the future.

Friends of Arboretum Creek



SEATTLE PARKS FOUNDATION

¹ This report can be cited as: Galvin, Dave (2020), *Results of Storm Water Quality Sampling in Arboretum Creek in December, 2019: FOAC Technical Memorandum #4*, available from galvind53@gmail.com.

Three previous technical memos² documented all previously available data relative to the study area plus our dry- and wet-weather water quality results from samples taken in September 2018 and January 2019. These latest results, summarized here, complement the earlier work with further data documenting organic contaminants related to a large storm event.

STORM-EVENT SAMPLING:

On **December 20, 2019**, the Seattle area experienced 2.69 inches of rainfall for the largest single-day total in ten years and the 15th wettest day ever recorded since records began in 1945. Larry Hubbell seized the moment to collect three water samples. He selected two curb-cut locations immediately adjacent to Lake Washington Blvd. between the Japanese Garden and Boyer Ave. E, where stormwater runoff flows directly off the roadway into Arboretum Creek. He also sampled the main creek to the north, just upstream (south) of the Wilcox Bridge where the stream enters a culvert before discharging into Union Bay to the north. Figures 1 and 2 show the locations of these three samples. It should be noted that the location of his grab sample from the stream near the Wilcox Bridge was downstream from where the Woodland Garden Ponds tributary joins the stream. However, it was upstream from the point where the Lake Washington Blvd. runoff, which originates near the bridge, joins the stream. The small pipe containing the road runoff enters the stream from the east just before the stream disappears into the culvert.

SAMPLE ANALYSIS:

We continued to contract with King County's Environmental Lab (KCEL) to do the analyses of our samples, consistent with previous work. KCEL provided us with the clean sample bottles. We followed all of the rigorous KCEL protocols for sample collection.

Based on previous results and our interests in assessing the contribution of stormwater runoff to the creek, we opted to focus analyses specifically on diesel and lube-oil organics are indicators of stormwater. These parameters are described in detail in our TM#1 and TM#2.

FINDINGS:

Results from KCEL are shown in Tables 1-3. Note that the data are reported with a Value obtained, as

² Galvin, Dave (2018a), *A Summary of Previous Water Quality Studies of Arboretum Creek: FOAC Technical Memorandum #1* (last updated 8/13/2018); Galvin, Dave (2018b), *Results of Dry Weather Water Quality Sampling around the Headwaters of Arboretum Creek in September, 2018: FOAC Technical Memorandum #2* (last updated 12/29/2018); Galvin, Dave (2019), *Results of Wet Weather Water Quality Sampling around Arboretum Creek in January, 2019: FOAC Technical Memorandum #3* (last updated 3/6/2019). These documents are available from galvind53@gmail.com.

well as the Method Detection Limit (MDL) and the Reporting Detection Limit (RDL), which reflect the lowest concentrations that can reliably be reported for the analytical protocol used.

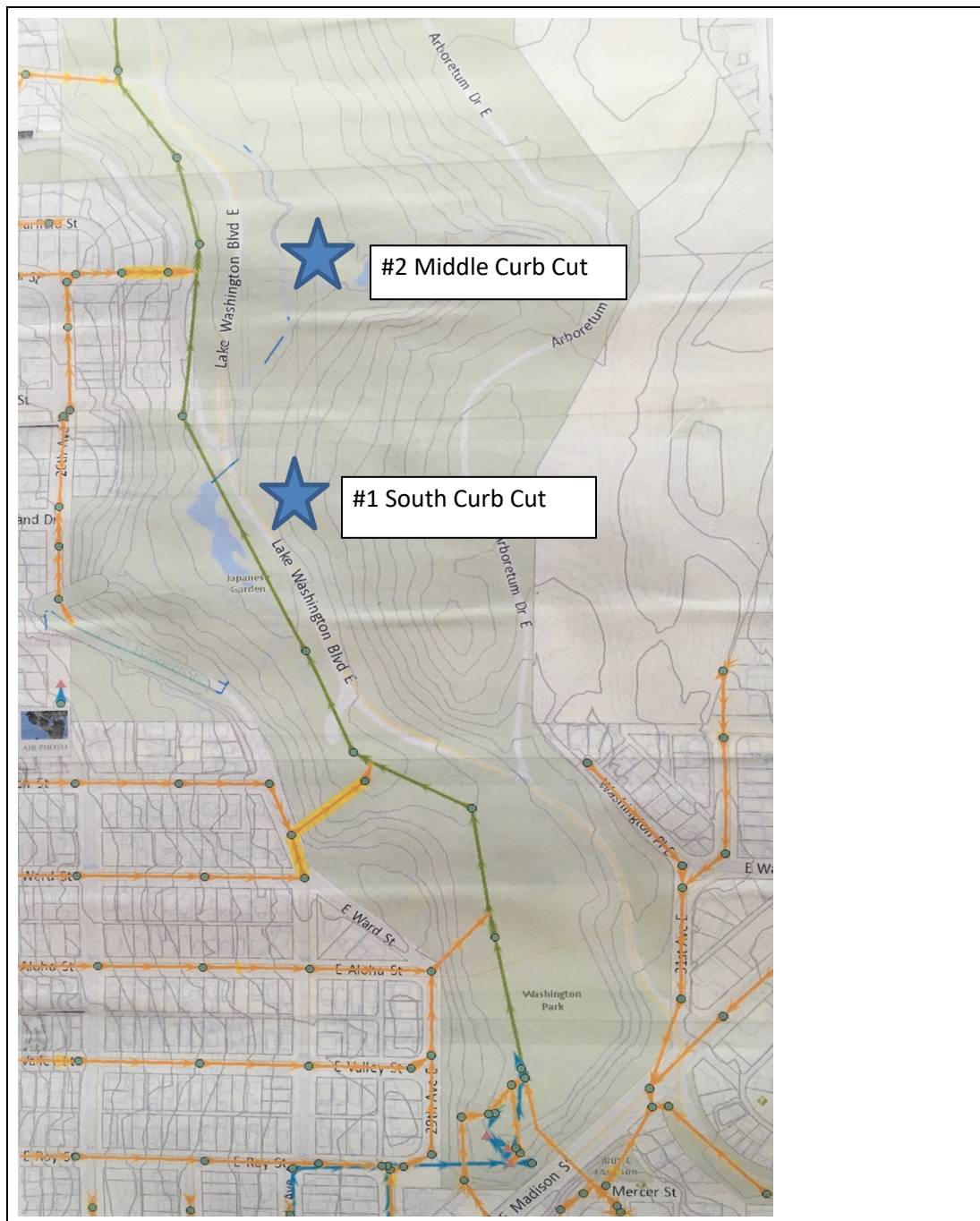


Figure 1. Map locating the two curb-cut sampling sites along Arboretum Creek.



Figure 2. Map locating the third sample in the creek just south of the Wilcox Bridge.

Table 1. Results for Sample #1 at the South Curb Cut.

<div> <div>Project: 421874-860</div> <div>Locator: NONE</div> <div>Descrip: UNKNOWN LOCATOR</div> <div>Sample: L73893-1</div> <div>Matrix: LG STORM WTR</div> <div>ColDate: 12/20/19 11:00</div> <div>ClientLoc: South Curb Cut</div> <div>WET Weight Basis</div> </div>					
Parameters	Value	Qual	MDL	RDL	Units
ES NONE					
Client Locator	South Curb Cut				none
OR WDOE NWTPH-DX					
Diesel Range (>C12-C24)	0.605		0.227	0.227	mg/L
Lube Oil Range (>C24)	1.76		0.227	0.227	mg/L

Table 2. Results for Sample #2 at the Middle Curb Cut.

Project: 421874-860 Locator: NONE Descrip: UNKNOWN LOCATOR Sample: L73893-2 Matrix: LG STORM WTR ColDate: 12/20/19 12:00 ClientLoc: Middle Curb Cut WET Weight Basis					
Parameters	Value	Qual	MDL	RDL	Units
ES NONE					
Client Locator	Middle Curb Cut				none
OR WDOE NWTPH-DX					
Diesel Range (>C12-C24)	0.419		0.286	0.286	mg/L
Lube Oil Range (>C24)	2.46		0.286	0.286	mg/L

Table 3. Results for Sample #3 in the main Arboretum Creek immediately upstream of Wilcox Bridge.

Project: 421874-860 Locator: NONE Descrip: UNKNOWN LOCATOR Sample: L73893-3 Matrix: LG STORM WTR ColDate: 12/20/19 13:00 ClientLoc: Wilcox Bridge WET Weight Basis					
Parameters	Value	Qual	MDL	RDL	Units
ES NONE					
Client Locator	Wilcox Bridge				none
OR WDOE NWTPH-DX					
Diesel Range (>C12-C24)		<MDL	0.204	0.204	mg/L
Lube Oil Range (>C24)		<MDL	0.204	0.204	mg/L

Diesel Range Organics and Lube Oil Range Organics were detected well above the lower analytical limits in both stormwater (curb-cut) samples. This is to be expected and confirms one distinct characteristic of

stormwater runoff, especially from a busy road with significant traffic. Lube oil levels of 1.8 to 2.5 parts per million can be compared to local data from the 520 bridge (see TM#1), which had a median value of 3.6 and a range from 1.4 to 11. This is in agreement with general findings over many decades that levels of contaminants in stormwater runoff are directly related to traffic volume.

No diesel or lube oil was detected in the downstream sample within the creek. Dilution from drainage within the Arboretum that is not influenced directly by road runoff is the likely explanation. As noted earlier, a significant amount of flow from the blvd. was entering the creek just downstream of where this sample was taken; it is likely that more diesel and lube oil could have been entering the creek due to the high flows from this significant storm.

How pulses of lube oil during large storm events might affect biota in the creek is unknown at this time.

CONCLUSIONS:

As expected, direct stormwater runoff from Lake Washington Blvd. contains detectable amounts of diesel and lube oil organics, reflecting sources from the significant volume of traffic on that roadway.