



Appendix C

Whipple Creek Watershed-Scale Stormwater Plan Report

2015 Benthic Macroinvertebrate Summary

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Introduction

The Washington State Department of Ecology issued a 2013-2018 Phase I Municipal Stormwater Permit (Permit) on August 1, 2012 that requires Clark County (County) to select a watershed and perform watershed-scale stormwater planning as outlined in section S5.C.5.c. This summary outlines the results of the 2015 benthic macroinvertebrate field work performed for the Clark County Watershed-Scale Planning of Whipple Creek.

Benthic Macroinvertebrate data, as presented as the Benthic Index of Biological Integrity or BIBI is a widely used stream health indicator in the Pacific Northwest. Macroinvertebrate data will be used to characterize current watershed conditions and compare to modeled flow metrics as described in the Permit. The BIBI is a multimetric index that considers 10 characteristics of the creatures inhabiting gravel riffles in wadeable streams. Stream hydrology impacts on streambed stability have a major influence on the assemblage of creatures living within the gravel substrate. Benthic macroinvertebrates are good indicators of stream health because of their potentially high numbers, known pollution tolerances, limited mobility, wide range of feeding habits, varied life spans, and dependence on the land environment around the stream. The species and number of macroinvertebrates present in a stream segment are used to calculate a Benthic Invertebrate Index of Biological Integrity (B-IBI) score (Karr, 1998; Karr and Chu, 1999) or other appropriate metrics.

Methods

Sampling Schedule

Most work for benthic macroinvertebrate sampling will take place from July to October. Typically base flow conditions are desired, taking into account low-flow years and the potential for perennial streams to run dry. Benthic macroinvertebrate populations are stable and individuals are large enough to be easily identified at the lab. Samples were collected at gravel reaches in the main stem and gravel bedded tributaries during summer base flow (early August 2015).

Representativeness

The Watershed Plan Macroinvertebrate project data are intended to be representative of conditions at each sample station. The Clean Water Division utilizes standard monitoring procedures designed to facilitate the collection of representative samples.

Benthic macroinvertebrate protocols are also designed to facilitate the collection of representative samples. For example, macroinvertebrate sampling is typically conducted moving from downstream to upstream to avoid contamination of downstream samples.

Site Selection

Key of the BIBI metric assumptions limited sites to stream reaches where sample reaches consisted of riffle-habitat with gravel substrate. Whipple Creek geology is predominantly fine-grained Ice Age Cataclysmic Flood deposits with limited amounts of Pliocene Troutdale Formation sand and gravel deposits. Data will be collected at WPL050, WPL080, MCT010, and PCK010. There are over 10 years of

macroinvertebrate data at WPL050, and as of 2015, two years at MCT010, PCK010 and WPL080 (Figure1).

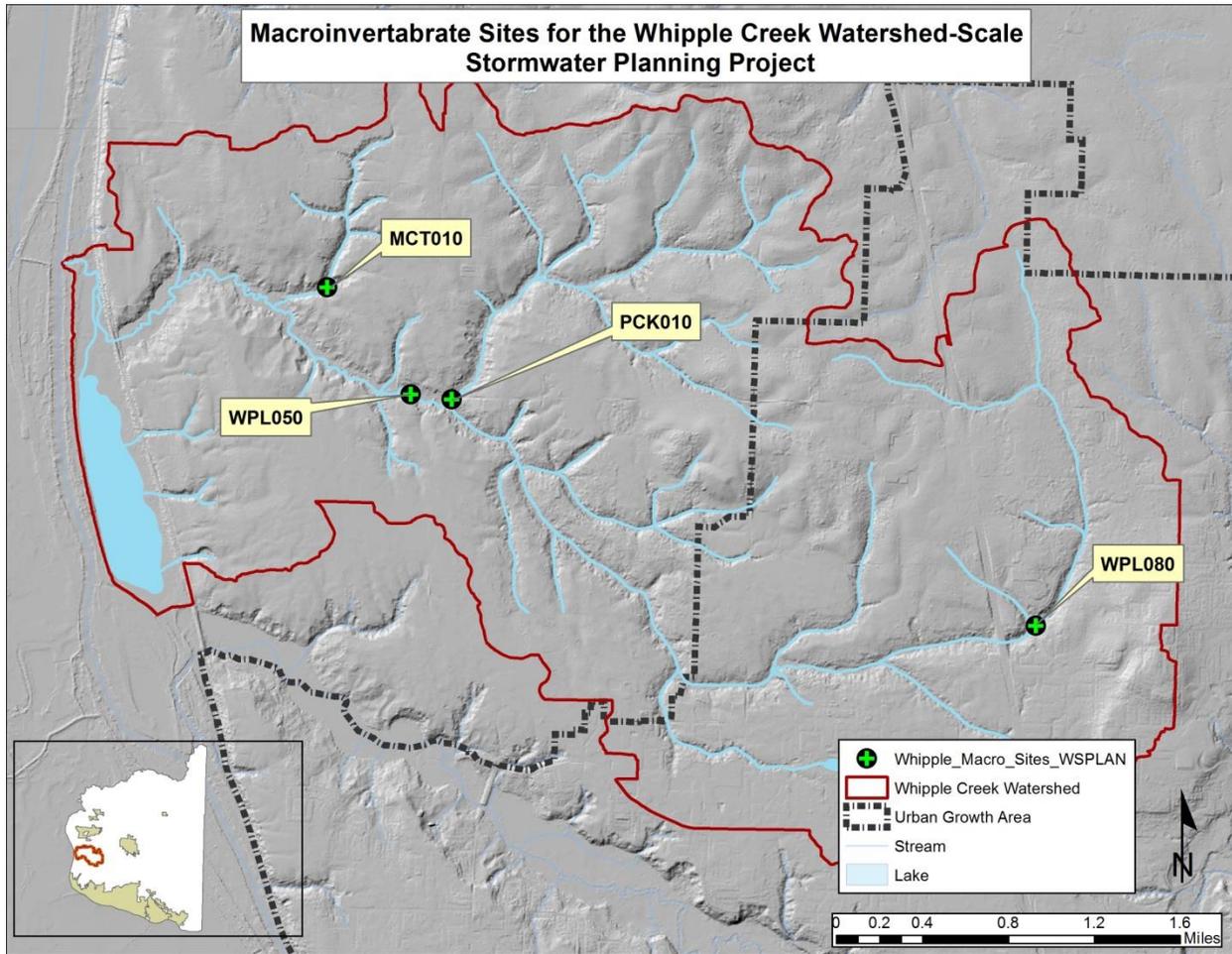


Figure 1 Clark County macroinvertebrate sites

Field Procedures

Benthic macroinvertebrate samples are collected following procedures described in the Washington State Department of Ecology Standard Operating Procedures and Minimum Requirements for the Collection of Freshwater Benthic Macroinvertebrate data in Wadeable Streams and Rivers (Ecology 2010). All sampling, analyses, and data management procedures are conducted according to guidelines established in the Clark County NPDES Whipple Creek Water Quality and Biological Assessment Project (2014), the county's Standard Procedures for Monitoring Activities: Clark County Water Resources Section (2003), and as referenced in the contracts between Clark County and the laboratory facilities.

All field activities are conducted by CWP staff (Figure 2). Benthic macroinvertebrate samples are collected in one liter polyethylene bottles preserved according to laboratory specifications. These samples are kept refrigerated or in coolers until delivery to the contracted benthic macroinvertebrate laboratory for analysis.



Figure 2 B-IBI stream macroinvertebrates field sampling

Results and Discussion

Table 1 provides an assessment of the 2014 B-IBI scores for the Whipple creek subwatershed. Benthic macroinvertebrates are used as an indicator of stream health as they require high water quality for sensitive species to survive in the waterbody. Laboratory-assigned B-IBI ranges biological integrity are:

- Low: 10 - 24
- Medium: 24 – 39
- High: 40 - 50

The higher the presence of sensitive insect species, the more likely fish and other wildlife will thrive at the location. As of 2015, Three out of four stations had low biological health based on the benthic index. PCK010 and WPL050 represented the lowest scores of the sampled reaches. WPL080 had the highest score on the main stem. MCT010 a tributary of Whipple creek had the overall highest score. However, MCT010A, a duplicate sample of MCT010, had a very low score, which may be accounted for in fouling of the substrate but the field crew. Stations with low to moderate biological health reflect impacts from both urban and rural land uses.

Table 1 2015 Clark County BIBI results

Station River mile METRIC	Packard Creek		Whipple Creek		Whipple Creek		Whipple tributary		Whipple tributary	
	PCK010		WPL050		WPL080		MCT010		MCT010A-dup	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Total number of taxa	36	3	39	3	43	4	44	4	39	3
Number Ephemeroptera taxa	4	1	4	1	3	1	4	1	4	1
Number Plecoptera taxa	2	1	1	1	5	3	6	3	4	3
Number Trichoptera taxa	5	3	6	3	7	3	6	3	5	3
Number of long-lived taxa	4	3	3	3	4	3	4	3	4	3
Number of intolerant taxa	2	1	1	1	0	1	4	5	2	1
% Tolerant taxa	73.55	1	60.41	1	61.43	1	25.45	3	37.89	3
% Predator	3.5	1	3.7	1	7.3	1	12.5	3	8.4	1
Number of clinger taxa	17	3	19	3	22	5	16	3	19	3
% Dominance (3 taxa)	62.2	3	46.2	5	50.1	3	42.4	5	64	3
TOTAL SCORE		20		22		25		33		24

Error! Reference source not found. provides an assessment of the 2014 B-IBI scores for the Whipple creek subwatershed. All of the scores were poor with the exception of MCT 010 tributary, which is consistent with the 2015 results. MCT010 is a fairly isolated tributary with little urban influences. The site is primarily surrounded by rural private land.

Table 2 2014 Clark County BIBI results

Station River mile METRIC	Packard Creek		Whipple Creek		Whipple Creek		Whipple tributary		Packard Creek	
	PCK010		WPL050		WPL080		MCT010		PCK010A-dup	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Total number of taxa	31	3	32	3	40	4	44	4	29	3
Number Ephemeroptera taxa	3	1	4	1	2	1	6	1	3	1
Number Plecoptera taxa	2	1	2	1	5	3	7	3	2	1
Number Trichoptera taxa	2	1	5	3	5	3	3	3	2	1
Number of long-lived taxa	4	3	6	5	7	3	7	3	4	3
Number of intolerant taxa	0	1	1	1	1	1	3	5	1	1
% Tolerant taxa	53.96	1	35.25	3	59.50	1	21.58	3	39.93	3
% Predator	1.66	1	0.72	1	5.41	1	2.34	3	1.78	1
Number of clinger taxa	10	1	15	3	14	5	15	3	12	3
% Dominance (3 taxa)	69	3	55	3	54	3	40	5	63	3
TOTAL SCORE		16		24		24		32		20

Maximum score of 50.
 Each metric scored:
 1=low, 3=moderate, 5=high

Conclusions

The B-IBI scores for the 2015 sampled year are consistent with the urbanized land-use expected. Biological condition has remained about the same over the two-year assessment period.

References

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