



2015 Water Quality Monitoring Program Overview

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Introduction

Since 2009 West Multnomah Soil & Water Conservation District (WMSWCD) has monitored streams in the rural Tualatin Mountains (“West Hills”). The Water Quality Monitoring Program is intended to guide the strategic planning of WMSWCD while continuing to inform our restoration work and the story of how these watersheds are faring through time. The selection of the focus or “study area” has been driven by a lack of existing data (prior to 2009), positive identification of salmon in McCarthy Creek, and emphasis of these watersheds in the WMSWCD strategic plan.

Water quality data for perennial streams flowing out of the Tualatin Mountains is quite limited. Streams located within the City of Portland are often monitored by the Bureau of Environmental Services (BES, 2010) while streams on the south side of the Tualatin Mountains, which eventually flow into the Tualatin River, are monitored by Clean Water Services (Cole, 2006). However, the quality of streams in the rural areas of the Tualatin Mountains, which flow north into the Multnomah Channel, is poorly understood.

While most of McCarthy Creek is listed as Essential Salmonid Habitat by the Oregon Department of Fish and Wildlife (ODSL, 2010), none of these streams are listed on the Oregon Department of Environmental Quality (DEQ) 303(d) list (ODEQ, 2012). However, DEQ lists them all as “salmon and trout rearing and migration habitat” and McCarthy is additionally listed for spawning habitat for salmon and steelhead (DEQ, 2003). The Water Quality Program focuses on the watersheds of Miller, McCarthy and Crabapple/Patterson Creeks. These flow year-round and are the largest watersheds within the study area. As a result, they have the potential to be “salmon bearing” have been labeled as “priority watersheds” by the Conservation District’s strategic plan.

Descriptions of watersheds

McCarthy Creek

McCarthy Creek watershed is a salmon-bearing tributary to Multnomah Channel located 12 miles northwest of Portland. Landownership in the watershed is a patchwork. Private ownership accounts for 92% of the tax lots (237 total owners) and almost 80% of the 2,800 acres. Private tax lot zoning within the watershed is split between forestry and rural residential with a significant portion in agriculture. Agriculture-related activities

are especially concentrated near streams and low, wet areas. Portland Metro is the primary public landowner (~500 acres) while the USDA-NRCS possesses a Wetland Reserve Program easement on 120 acres at the very bottom of the watershed.

Crabapple Creek

The Crabapple Creek watershed is the most northern watershed in the scope of the project. It is comprised of two similarly sized basins, Crabapple and Paterson creeks, which total approximately 2,500 acres. These two streams converge on the Wildwood Golf Course, which takes up 90 acres at the very bottom of the watershed. The stream crosses under US Highway 30 nine-hundred feet upstream of the confluence where it then discharges into a large wetland complex. The northern section of the watershed is dominated by industrial forest land while to the south it is mostly comprised of non-industrial private forests.

Miller Creek

At approximately 760 acres, it is the smallest watershed within the study area yet is one of the only other streams within the study area with year-round flow. Miller Creek is the least disturbed and least developed of the three watersheds. Previous City of Portland monitoring (BES, 2010) found Miller Creek to be in relatively good shape for all parameters tested – including temperature. As such, it is the “reference” site for the purpose of this water quality monitoring program.

Methods

All monitoring methods are based on the “Oregon Plan for Salmon and Watersheds Water Quality Monitoring Guidebook” which can be found here: http://www.oregon.gov/OWEB/docs/pubs/wq_mon_guide.pdf

Continuous Temperature Monitoring

Streams listed as “salmon and trout rearing and migration habitat”, which all streams within the study are, they are subject to the following water quality standard set by Oregon DEQ: **the seven-day average daily maximum (7dAM) should not exceed 18°C (64.4° F)**. DEQ uses 7dAM temperature criteria for tracking and reporting *continuous temperature monitoring* in streams – which is the approach WMSWCD employs.

The criteria was established because temperatures above 18°C reduce the beneficial uses of salmonid spawning and rearing, as listed in the Oregon Administrative Rules (OAR 340-41-442). The temperature standard is 12.8°C (55°F) in periods of time when salmonid spawning occurs (October to May). Most streams in western Oregon meet the spawning standard. The temperature criterion for “salmon rearing and migration” is the largest concern due to the presence of inline ponds and alterations to riparian zones in many county streams, which influence summer in-stream temperatures.

One HOBO® TidbiT® v2 Submersible Temperature Logger was placed at each of the sites – usually beginning in May or June. All probes were taken out in the fall – typically in October. Data is downloaded to Microsoft Excel worksheets and was run through DEQ’s HYDROSTATS Simple where the 7 day average daily maximum (7dAM) was calculated.

Benthic Macroinvertebrate Surveys

Benthic macroinvertebrates are one set of aquatic organisms that indicate water quality. They are a critical link the aquatic food chain because they eat the plant matter that falls into the bodies of water in which they live and in turn, fish and larger animals eat them. Changes to stream chemistry and physical habitat can directly and indirectly affect the types and distribution of benthic macro-invertebrates. Benthic organisms live

in the lower or bottom part of the water column. Macroinvertebrates can be seen with the naked eye (macro) and do not have backbones (invertebrate).

Benthic macro-invertebrates' life cycles are approximately one year long. Therefore they incorporate changes instream chemistry and physical factors over an entire year rather than the single point in time of most water quality measurements. In addition they do not travel or migrate in water much, which makes the collection of macroinvertebrates relatively easy.

Samples of macro-invertebrates are actually composites of several subsamples for each site. Using "D" or "kick" nets, a total of 8 subsamples are collected starting downstream and working upstream for approximately 150 meters. Each subsamples is collected into a single sample jar or set, preserved with ethanol, and shipped to an accredited lab for "Level-3" analysis. Samples for streams within the study area should be taken in mid to late summer and several days after any significant storm event. Samples are taken on a 5 year cycle which began after the establishment of baseline conditions in 2009 and 2010.

Summary of past findings

McCarthy Creek – Data collected by Multnomah County (MCRS, 2010) and WMSWCD show that McCarthy Creek has elevated levels of both temperature and sediment with temperature being the greatest concern. Summer temperatures exceed the 7 day average daily maximum (7dAM) temperature criteria (18° C/64° F) for most of July and August. Data collected for sites in the middle and upper reaches of the watershed indicate most of heating occurs in the Folkenberg area or below. Macroinvertebrate samples have shown that McCarthy Creek is moderately impaired with elevated temperatures and sediment loads as the primary causes. The latter of which has been shown to be the most significant.

Crabapple Creek – A single probe has been deployed on Crabapple Creek just downstream of Highway 30 and the railroad tracks since 2011. Past data indicated similar temperature fulgurations as McCarthy Creek. Several spikes in temperature were observed in 2012 and theorized to be human induced but have not been seen since. With lack of upstream data, it is hard to know the specific areas contributing to the heating. Like McCarthy Creek, macroinvertebrate samples have shown that both sediment and temperature are the primary factors in degraded water quality. However the sampling area is within a 2005 in-stream project by Metro and may still be coming back into equilibrium.

Miller Creek – In order to offset yearly variability a probe has been deployed on Miller Creek since 2011. Miller was selected due to its proximity (3 miles), equivalent aspect and similar land use to McCarthy. According to past water quality data Miller Creek has the least degraded water quality for perennial streams in the West Hills. During the study period beginning in 2011, the 7dAM has never risen above 18°C. Macroinvertebrate data has shown that Miller Creek is not impaired.

Reporting

WMSWCD strives to provide annual reports for each monitoring season. Reports can be found on its website: <https://wmswcd.org/programs/water-quality-monitoring/>.

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Water Quality Monitoring Program Map



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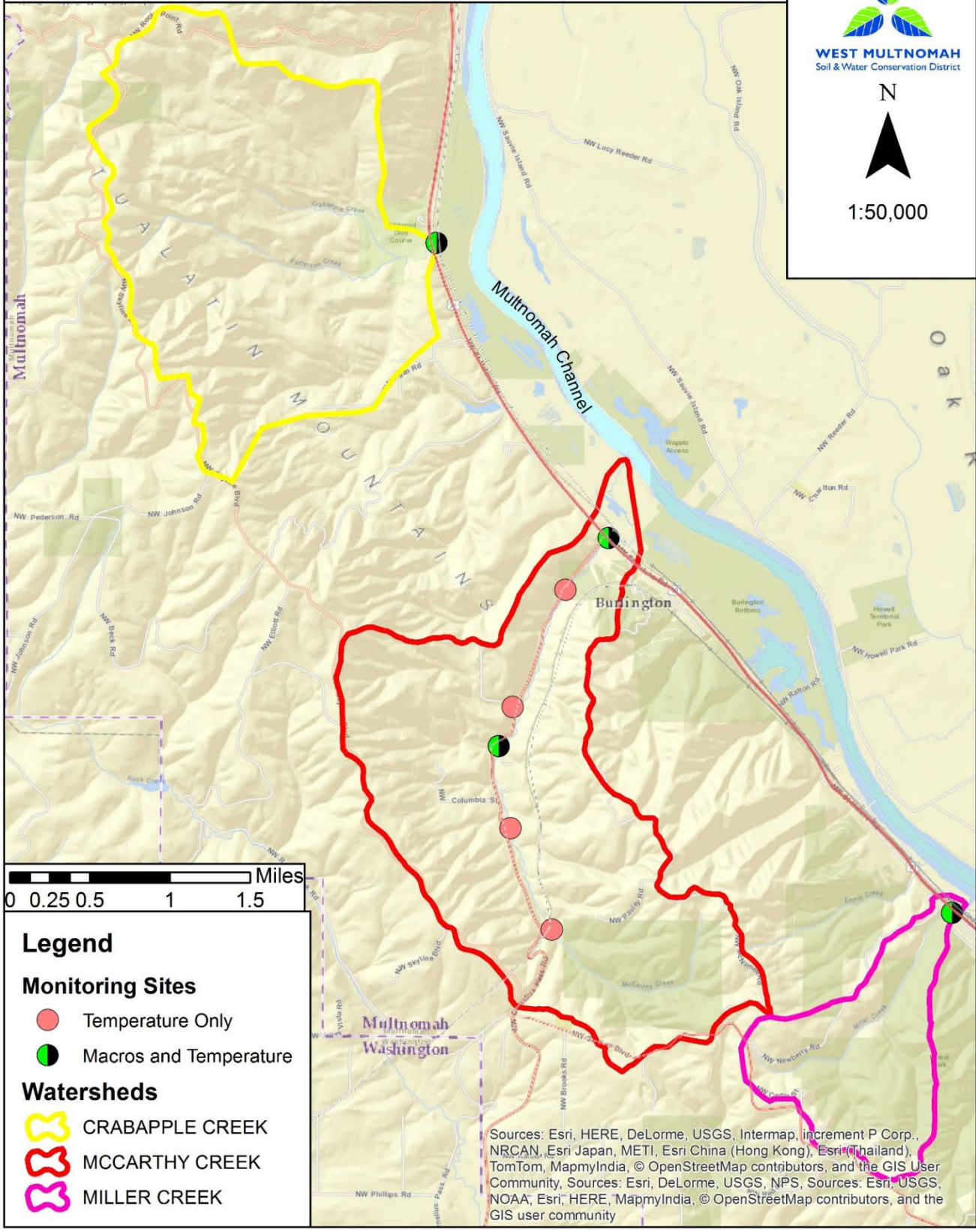


Figure: Map of monitoring locations within the WMSWCD Water Quality Program Study Area as of February 2016.