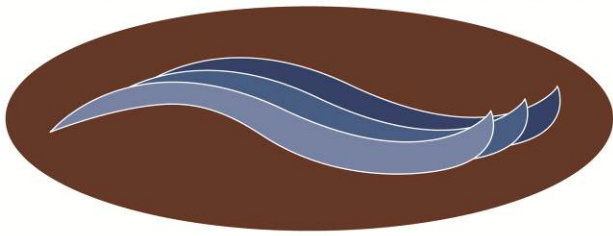


WEST MULTNOMAH



SOIL & WATER CONSERVATION DISTRICT



Photo: Juvenile Chinook Salmon, caught in McCarthy Creek on May 29,2012 (Credit: WMSWCD)

2012 Water Quality Monitoring Report

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Introduction: Since 2011 West Multnomah Soil & Water Conservation District (WMSWCD) water quality monitoring efforts have been focused on perennial streams in the rural part of western Multnomah County that flow directly into the Multnomah Channel. This is due to the lack of monitoring data as well as the presence of WMSWCD and Portland Metro restoration activities in these watersheds. For 2012, five monitoring stations were set up on three streams (Miller, McCarthy and Crabapple).

None of these streams are listed on the Oregon Department of Environmental Quality (DEQ) 303(d) list. However, DEQ lists them all as “salmon and trout rearing and migration habitat” while McCarthy is additionally listed for spawning habitat for salmon and steelhead (DEQ, 2003). Thus they are subject to a water quality standard: **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 impair 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). The temperature criterion for “salmon rearing and migration” is the largest concern due to the presence of inline ponds and alterations to the riparian zones in many county streams, which influence summer in-stream temperatures. Monitoring for the spawning period is not conducted since most streams in western Oregon meet the standard.

Data collected by Multnomah County in 2009 (MCRS, 2010) as well as the 2009-2010 WMSWCD benthic macroinvertebrate and 2011 temperature data (WMSWCD, 2011) have shown that McCarthy Creek has elevated levels of both temperature and sediment. Specifically, temperature has been the greatest concern. During the summer of 2009, McCarthy Creek exceeded the 7 day average daily maximum (7dAM) temperature criteria (18° C/64° F) for 45 days. In 2011, the standard was exceeded for 52 days (Appendix A1).

In 2012, two more probes were deployed in the upper watershed to isolate areas that may be contributing to the heating of the creek (Figure 3). The “Sheltered Nook” probe was deployed on a tributary which flows from the west into the middle section of McCarthy Creek. “Upper McCarthy” was deployed just upstream of the railroad crossing, below the segment of McCarthy Creek with the highest gradient and most intact riparian zone.

Recently there has been large scale restoration by Portland Metro where Crabapple Creek flows through the Multnomah Channel floodplain. This effort was made in part to benefit rearing juvenile salmonids. This has been brought into question the quality, specifically the temperature of the water flowing into the wetland complex. In addition, previous data for Crabapple Creek are very limited. Due to the lack of data, various land practices in the watershed and the partnership with Portland Metro, WMSWCD decided to include Crabapple Creek in 2012. A probe was placed just downstream of Highway 30 and the railroad tracks (figure 3).

In order to help offset yearly variability, a probe has been deployed on Miller Creek (Figure 3) since 2011. Miller Creek was selected due to its proximity (3 miles), same aspect and relatively similar land use to McCarthy. According to past water quality data (WMSWCD, 2011 & BES, 2010) Miller Creek has the least degraded water quality for perennial streams in the West Hills. In 2011, the 7dAM never rose above 18°C.

Method: One HOBO® TidbiT® v2 Submersible Temperature Logger was placed at each of the four sites (two in McCarthy and one each in Miller and Crabapple Creeks) on May 23rd, 2012. A fifth probe (Upper McCarthy) was added on May 25th, 2012. All probes were retrieved on November 6, 2012. Data was downloaded to Microsoft Excel worksheets and was run through DEQ’s HYDROSTATS Simple where the 7 day average daily maximum (7dAM) was calculated.



Results:

Of the five locations, four exceeded the rearing criteria (18°C) during the summer of 2012, Miller Creek being the only site that did not. However, the two probes in upper McCarthy Creek only exceeded the criteria for 3 and 4 days – “Upper McCarthy” and “Sheltered Nook” respectively (Table 1). These corresponded with one of the hottest parts of the year with maximum air temps at or above 31.7°C (89°F) for 10 of 14 days (8/3-8/17).

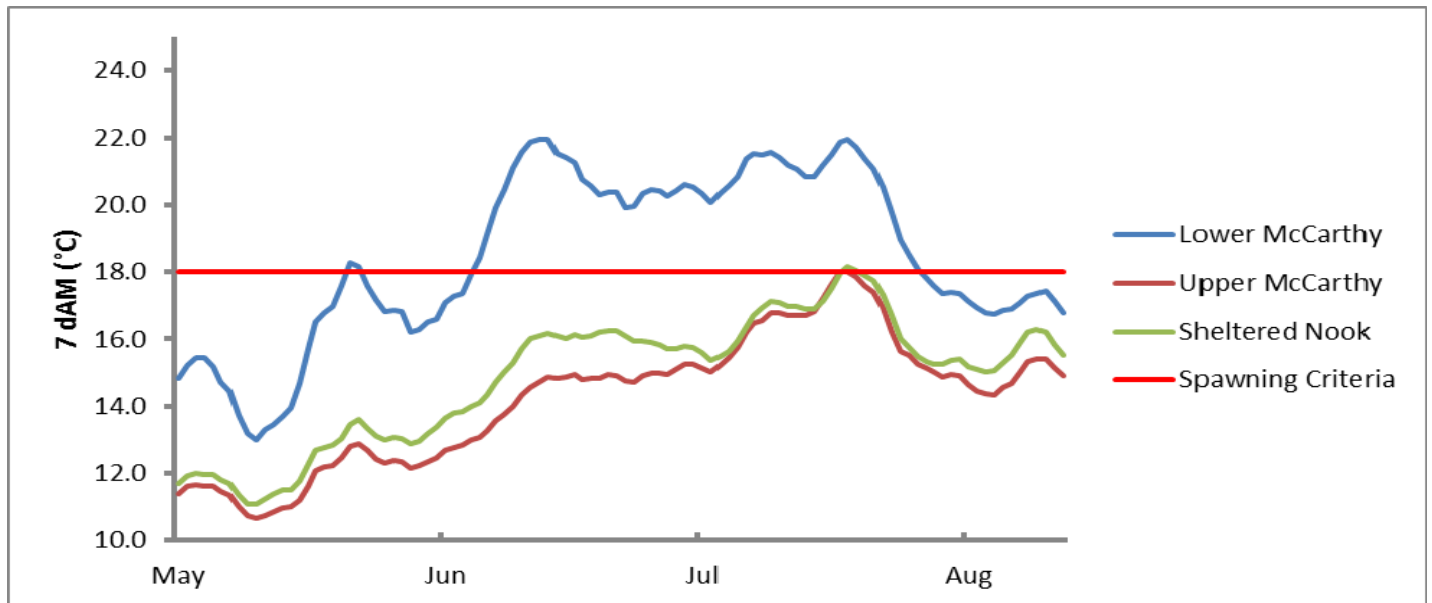


Figure 1: Seven-day average maximum summer temperatures for three sites on McCarthy creeks in 2012.

Lower McCarthy exceeded the 7dAM for 57 days and included a maximum value of 23.2°C (73.8°F). The total number of days above 18°C in 2012 surpassed both 2009 (45) and 2011 (52).

Crabapple Creek exceeded the 7dAM for 52 days (Table 1). However it reached the highest daily maximum temperature of 29.6°C (82.3°F). There are two large spikes in temperature in mid-July and early August. While the reason for this is unknown, the hourly temperature measurements do not seem to indicate it was out of the water and flow has been observed year-round.

Miller Creek never exceeded the 18°C criteria in 2011 or 2012 and only reached a maximum of 15.9°C (60.6°F) in 2012.

Table 1: Summary by location of days in which 7 dAM was greater than 18°C and the highest daily maximum temperature.

Location	7 dAM > 18°C (Days)	Highest Daily Max Temp
Upper McCarthy	3	66.4°F , 19.1°C
Sheltered Nook (McCarthy)	4	66.9°F , 19.4°C
Lower McCarthy	57	73.8°F , 23.2°C
Crabapple	52	82.3°F , 29.6°C
Miller	0	60.6°F , 15.9°C

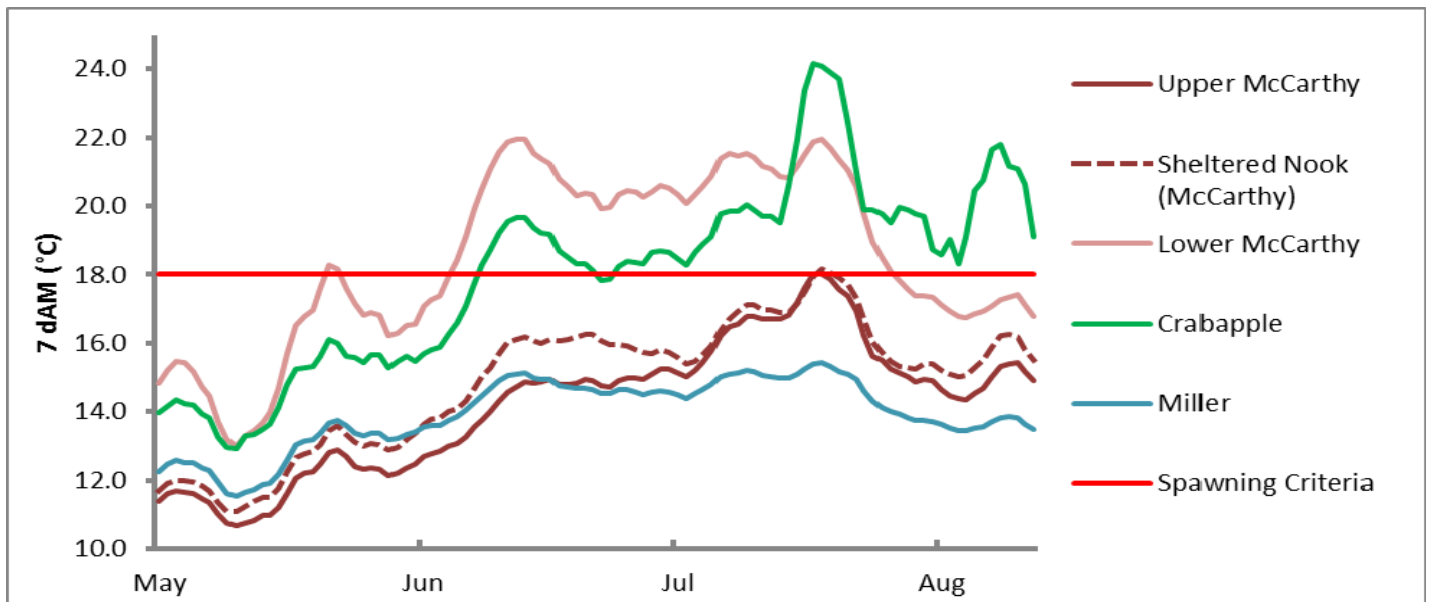


Figure 2: Seven-day average daily maximum summer temperatures for McCarthy, Crabapple, and Miller Creeks in 2012.

Conclusion: The summer of 2012 was relatively warm. However, results were similar to 2009 and 2011. While the watersheds for McCarthy and Crabapple Creeks are significantly larger and longer than Miller, the results are striking.

For McCarthy, these data seem to indicate that the cause of heating is lower in the watershed than the “Upper McCarthy” probe. - In addition, the tributary that runs along Sheltered Nook Road does not appear to be contributing to elevated temperatures. Past riparian vegetation surveys along McCarthy have broken the creek into three segments with the middle section containing the least riparian health cover. Future efforts should concentrate on this area to determine if this is the source of the heating or if something else is the cause.

The Crabapple Creek watershed is approximately the same size as McCarthy Creek with the majority of the acreage in well managed timber land with adequate riparian cover. However, the middle portion of the basin just upstream of Highway 30 is dominated by a golf course with little to no riparian cover and several ponds. This area is likely contributing to the elevated water temperatures. For much of the year, the water temperatures were below those observed in Lower McCarthy Creek (Figure 2). However, in mid-July and again in early-August two major spikes in temperature caused the ambient stream temperature in Crabapple Creek to go well above those observed in McCarthy Creek where it stayed until end of the sampling period (November 6th).

The exact reason behind this is unknown. The probe may have been in stagnant water, though flow is typically observed year-round. Upstream pond releases could also explain the spikes in temperature; however, it is unclear whether this would cause temperatures to stay elevated. Issues with the probe and therefore with the data itself is a third possibility. Additional data collection is needed to determine if these observations are correct.

Monitoring will continue at least through 2013 and likely beyond. Additional probes will also likely be deployed in the middle sections of McCarthy Creek to get a better understanding of land use impacts there.

For more information please contact Scott Gall (scott@wmswcd.org).

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Appendix:

A1: Seven-day average maximum summer temperature data for McCarthy and Miller Creeks gathered by WMSWCD in 2011.

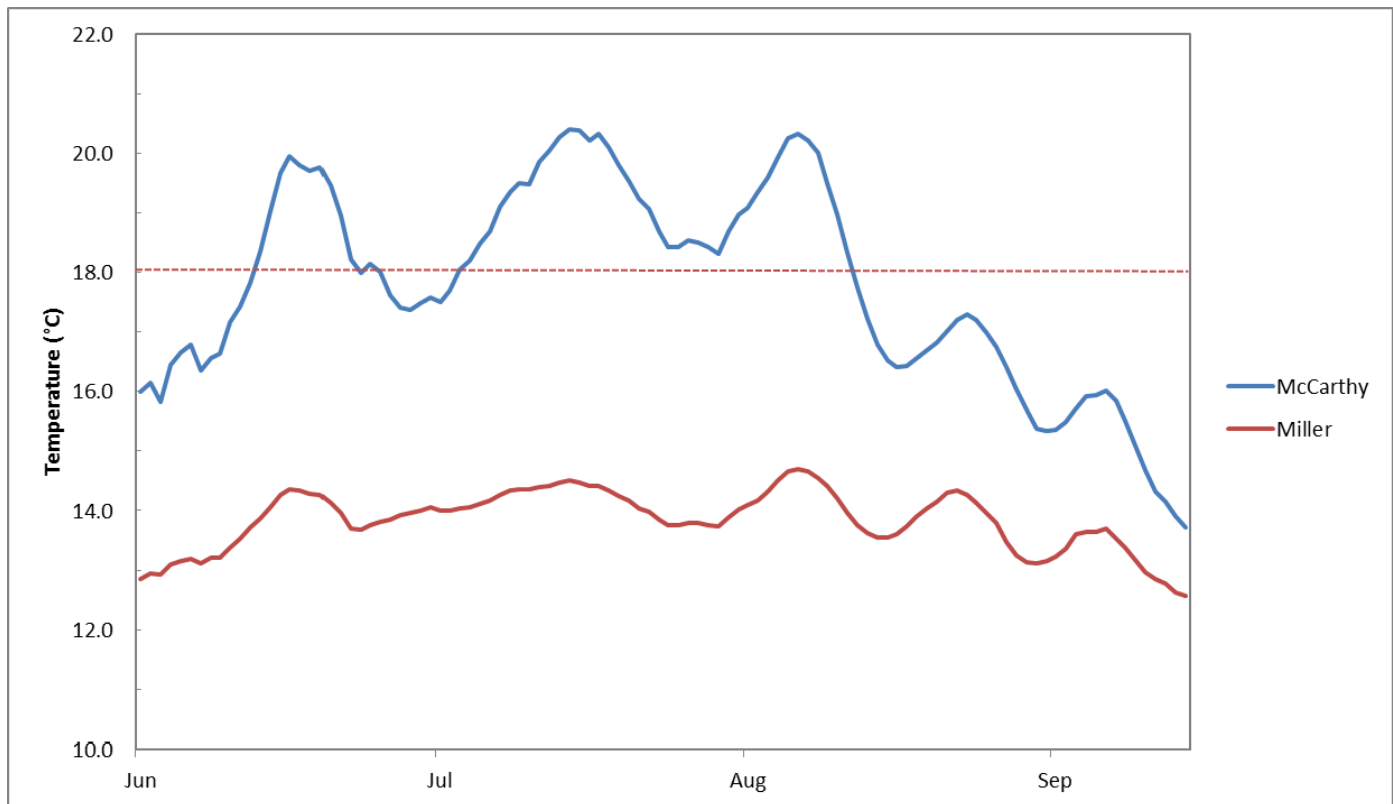


Figure 3: Map of Temperature Probe locations.

