



Prepared for Ecology on behalf of the Stormwater Workgroup by the City of Redmond in partnership with King County, and Herrera Environmental Consultants, LLC

Study Highlights

- While few consistent improving trends were detected due to rehabilitation technical issues in the Application watersheds, improving trends have been detected when the City has implemented focused, large scale rehabilitation efforts in a particular Application watershed.
- Monitoring for this project is scheduled to continue through Water Year 2025 and has gathered valuable data to inform regional stormwater management strategies for rehabilitating urban streams at the watershed scale.

Goal & Background

Ideally, if all developed land in a watershed is equipped with nonstructural and structural stormwater controls, the receiving water would be protected from hydrologic and water quality impacts caused by urbanization. However, while the effectiveness of nonstructural and structural controls has been well documented at the site and parcel scale, limited data exists on the effectiveness of these controls in aggregate for improving conditions in receiving waters at the watershed scale.

In 2014, the City of Redmond (City) completed development of a Citywide Watershed Management Plan (WMP) that holistically coordinates its stormwater management activities. Through the implementation of this WMP, the City is focusing stormwater best management practices (BMPs) in a subset of priority watersheds that are moderately impacted by urbanization and therefore expected to respond more quickly to rehabilitation efforts. This provides a unique opportunity to study the effectiveness of stormwater BMPs for improving receiving water conditions on an accelerated time frame and at a watershed scale.

The specific goal of the RPWS is to evaluate the effectiveness of the following rehabilitation efforts for improving receiving water conditions at the watershed scale:

- Stormwater management retrofits in upland areas that include installation of BMPs for onsite stormwater runoff treatment and flow control.
- Riparian and in-stream habitat improvements.
- Programmatic practices for stormwater management (e.g., more frequent street sweeping).

For more background on the RPWS, see [SAM Fact Sheet #6: Redmond Paired Watershed Study – Status Update](#). Findings from the previous trend report (2016-2019) are summarized in [SAM Fact Sheet #23 Redmond Paired Watershed Study – Interim Findings](#).

The RPWS experimental design involves routine and continuous measurements of various hydrologic, chemical, physical habitat, and biological indicators of stream health over an extended time frame to quantify improvements in receiving water conditions in response to watershed rehabilitation efforts. Using a “paired watershed” experimental design, these measurements are collected in seven watersheds categorized as follows:

- Three “Application” watersheds with streams that are moderately impacted by urbanization and prioritized for rehabilitation efforts: Evans Creek, Monticello Creek, and Tosh Creek watersheds. (Note the Evans Creek watershed

Collectively improving stormwater management

Stormwater Action Monitoring (SAM) is a collaborative, regional stormwater monitoring program that is funded by more than 90 Western Washington cities and counties, the ports of Seattle and Tacoma, and the Washington State Department of Transportation. SAM’s goal is to improve stormwater management to reduce pollution, improve water quality, and reduce flooding. We do this by measuring stormwater impacts on the environment and evaluating the effectiveness of stormwater management actions.

was dropped from the study at the end of water year 2022.)

- Two “Reference” watersheds with relatively pristine streams that do not require rehabilitation: Colin and Seidel watersheds.
- Two “Control” watersheds with streams that are significantly impacted by urbanization and not currently prioritized for rehabilitation: Country and Tyler’s watersheds.

Monitoring for the study began in 2016 and is anticipated to continue for a 10-year timeframe. In study years 4, 8, and 10, trend analyses reports will summarize analyses to detect potential improving trends in receiving water conditions related to the implementation of rehabilitation efforts.

Project Findings

The second trend analysis report covering 8 years of RPWS implementation was recently completed. Read the full report at: [Redmond Paired Watershed Study Trend Analysis Report: Water Years 2016–2023](#). Major conclusions from annual monitoring and the trend report are as follows:

- Few consistent, long-term trends were detected in the data due to rehabilitation technical issues in the Application watersheds. However, when the City has implemented focused, large scale rehabilitation efforts in a particular Application watershed, improving trends that can be directly tied to these efforts have been detected. This includes a consistent and significant decrease in total

suspended solids and total copper concentrations in the Monticello Creek watershed that appeared related to a progressive increase in street sweeping frequency. The City is currently implementing several other focused, large scale rehabilitation efforts in Application watersheds that will be evaluated in the trend analysis report that will be prepared in study year 10.

- An interannual hydrologic trend was detected in the rainfall runoff response across all the stations located in the Application, Reference, and Control watersheds. This trend was likely caused by relatively wet water years at the beginning of the study and drier water years as the study progressed. This resulted in less saturation of the landscape during the drier water years and thus increased evapotranspiration and reduced interflow and overland flow. Hence, less water was observed exiting the watersheds via surface flow in the streams during the drier years.

Recommendations

The RPWS has gathered valuable data to inform regional stormwater management strategies for rehabilitating urban streams at the watershed scale. Other local governments should follow this project since the findings can be used to refine stormwater management programs and will help federal, and state agencies assess whether current regulations and program requirements are effectively improving stream conditions in urban areas.

Why does this study matter?

Ecological function in Puget Sound lowland streams is impaired to a large degree by outdated development practices and a lack of adequate post-construction controls for preventing adverse impacts from stormwater runoff. Information on the level of stormwater retrofit and stream rehabilitation required to restore ecological function in these areas is essential for guiding policies and programs on stormwater and receiving water management.

What should stormwater managers do with this information?

This study helps manage expectations of the public and elected officials at the planning stage by highlighting the time it takes for benefits of retrofits to become measurable. Stormwater managers may also need to identify additional indicators of project impacts or success.

What will Ecology do with this information?

Ecology will continue to fund stormwater infrastructure retrofits and other restoration and recovery efforts – particularly those identified and prioritized through science-based planning efforts. Ecology may determine that changes to municipal stormwater permit requirements are needed to meet Clean Water Act goals of protecting and restoring beneficial uses in receiving waters.

For more information, including the final report, see the website at

ecology.wa.gov/sam

To request an ADA accommodation, contact Ecology by phone at 360-407-6600 or email at chelsea.morris@ecy.wa.gov, or visit <https://ecology.wa.gov/accessibility>. For Relay Service or TTY call 711 or 877-833-6341