



Status and Trends Study of Puget Lowland Ecoregion Streams

By Curtis DeGasperi

In 2008, representatives of local, state and federal agencies, plus environmental and business groups, tribes and agricultural interests formed the Puget Sound Stormwater Work Group (SWG) and proposed a regional and collaborative stormwater monitoring framework for Puget Sound. This approach to monitoring was an innovative new part of the municipal stormwater permitting program administered by the Washington State Department of Ecology.

With funding from more than 90 western Washington cities and counties, the ports of Seattle and Tacoma, and the Washington State Department of Transportation, the SWG's proposal has become a reality now known as Stormwater Action Monitoring (SAM). The group aims to improve stormwater management that reduces pollution, improves water quality, and reduces flooding.

To achieve this goal, SAM monitoring targets three broad categories:

- **Effectiveness studies:** How well are required or innovative stormwater management practices working? What are the most common types of pollution in stormwater?
- **Status and trends studies:** How do we know if water quality is getting better or worse?
- **Source identification:** What are the common sources of illicit discharges? What are some regional solutions and elimination methods?

The SWG recommended four initial Puget Sound status and trends studies:

- Puget Lowland Ecoregion stream quality;
- Puget Sound urban nearshore sediment contamination;
- Puget Sound urban nearshore caged mussels tissue contamination; and
- Puget Sound nearshore indicator bacteria.

The initial assessments for these four ongoing studies have been completed. On behalf of the SWG, King County (in collaboration with Ecology, the U.S. Geological Survey, and the Puget Sound Partnership) summarized the results of the first round of sampling conducted as part of the Puget Lowland Ecoregion stream study. This effort is described below and the full report can be viewed on King County's [web site](#).

The long-term goal of the **Puget Lowland Ecoregion stream status and trends study** is to monitor how stream

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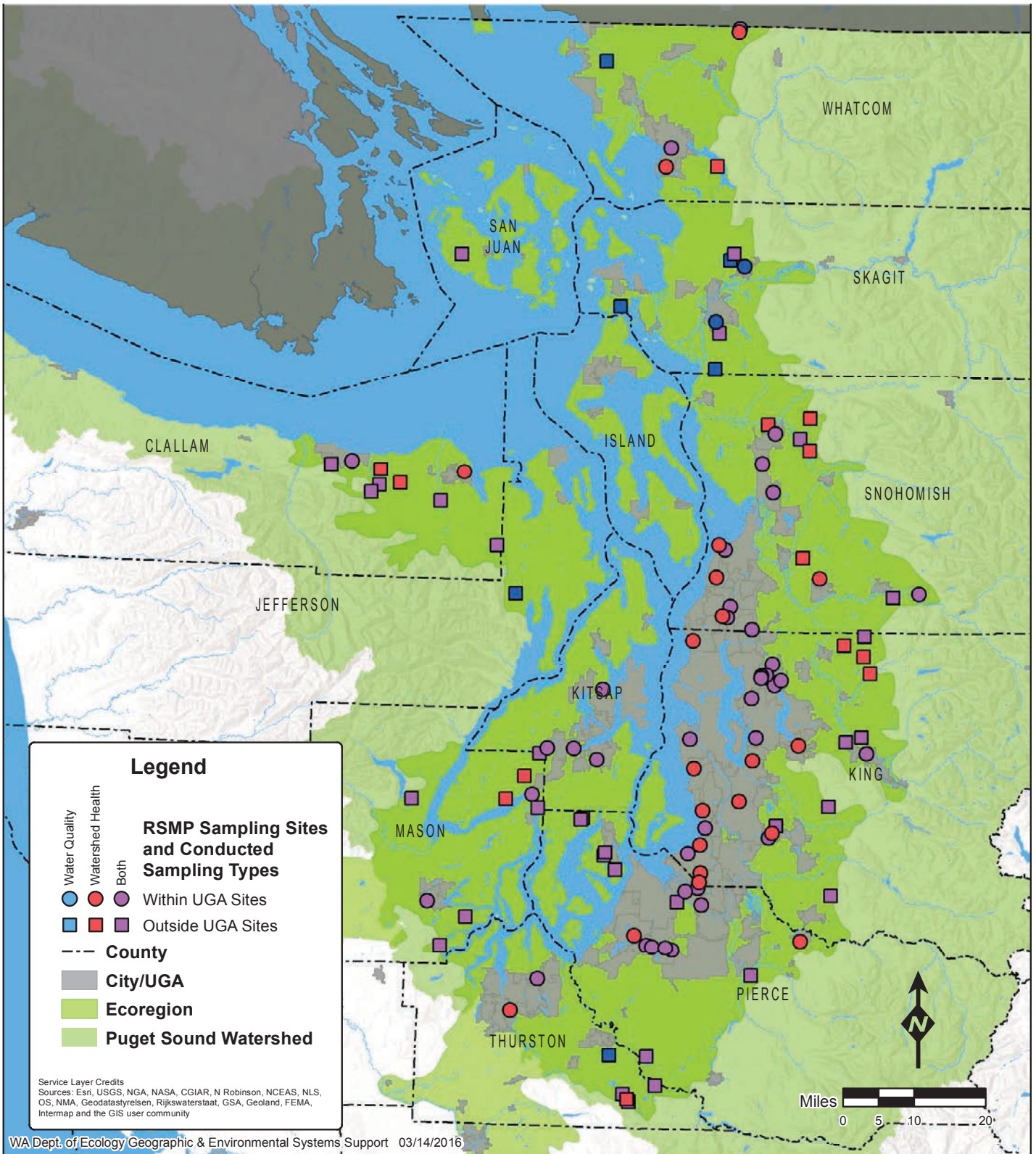


Figure 1. Puget Lowland Ecoregion small streams sampling locations.

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health changes over time in Puget Lowland streams as the region urbanizes and stormwater controls are implemented more broadly throughout the region.

The first round of monitoring in 2015 evaluated the current condition of wadeable streams within urban growth areas (UGAs) and outside UGAs, which represented a range of development conditions and impacts of stormwater runoff on small streams. Work included collecting monthly stream water quality data and one-time measurements of watershed health during summer (see Figure 1). Watershed health measurements included sampling for benthic invertebrates (to derive the benthic index of biological integrity score, or B-IBI), periphyton, sediment quality, and instream and riparian habitat. In addition, riparian and watershed scale land cover data was compiled to aid in the evaluation of factors associated with poor (or good) biological health.

The study questions were:

- *What is the status of Puget Lowland Ecoregion stream health within and outside UGAs?*
- *What are the major natural and human stressors impacting stream health?*
- *How do the results of this study compare to other stream monitoring programs?*
- *What monitoring parameters should be carried forward for SAM small stream monitoring in the future, and at what timing and frequency?*

The monitoring results included the following. Many of the stream health measures, such as fecal coliform bacteria, total phosphorus, and B-IBI indicated poorer conditions in urban streams compared to rural streams. For example, 82 percent of stream length within UGAs was in poor condition based on B-IBI scores, while 31 percent of stream length outside UGAs was found to be in poor condition (Figure 2). Key stressors identified included watershed and riparian canopy cover, stream substrate characteristics, and nutrients. Watershed and riparian canopy cover were found to be the most important stressors to B-IBI at the regional scale. This suggests that canopy cover protection and recovery (reducing impervious surface) could lead to substantial improvements in B-IBI scores.

The report also compared data collected from the SAM monitoring program with other Puget Lowland stream monitoring programs for B-IBI scores and parameters representing water and sediment quality and stream habitat measures. Variability in results among programs was attributed primarily to differences in study designs, spatial sampling extent, and differences in methods.

The SAM monitoring builds a strong base of information on stream condition that may be impacted by stormwater, and is expected to continue in the future as part of the regional stormwater program. The report identifies some options to improve the next iteration of small stream monitoring in the SAM program, such as to focus more specifically on the gradient of urbanization (e.g, relatively undeveloped to highly urbanized) rather than the broad UGA vs non-UGA areas. This will help the region target future stormwater management actions as well as better assess their effectiveness.

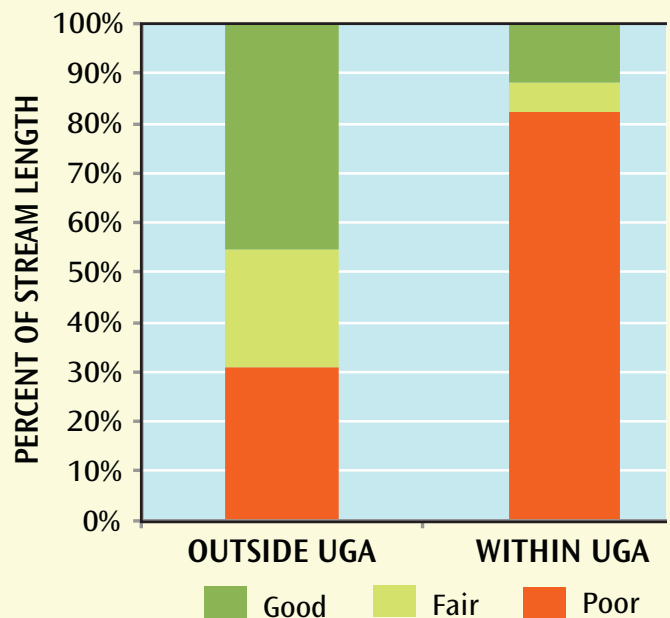


Figure 2. Percentage of stream length in good, fair, and poor condition for Puget Lowland Ecoregion streams outside and within Urban Growth Areas (UGAs).

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