

Flow Trend Analysis in the Rouge River Watershed and the Effect of Temporal Resolution on Trend Detection

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Abstract. The Rouge Project has monitored discharge at 13 continuous flow gauging stations serving drainage areas varying from nine to 410 square miles for the past 11 years as a means of evaluating existing conditions and tracking progress. This study evaluates the flow regime of the Rouge Watershed including the analysis of a decade or more of data, and status with regard to ecological targets. The temporal resolution of in-stream flow data required to establish long-term trends is also investigated by comparing flow exceedence frequency curves developed using 15-minute, hourly average, and daily average flow data and the Mann-Kendall analysis for trend at varying exceedence classes. Trend analysis of flow frequencies indicates that flow values have decreased, or have remained the same over the period of record examined for each flow monitoring station along the Main, Upper, and Middle Rouge Rivers. A strong trend of increasing flows was observed in the Lower Rouge River for flows in the low to mid-range, primarily due to increased wastewater treatment plant discharges. The direction of trends predicted by flows measured at a 15-minute, hourly-average, and daily average time scale did not vary, although trend strength varied significantly. Fewer differences in trend strength were observed between 15-minute and hourly-average data than between 15-minute and daily-average data, indicating that hourly data are adequate for trend analysis. The overall number of ecological flow targets that were met did not increase at nine Rouge flow monitoring stations between the time periods of 1994-1999 and 2000-2005. Summer improvements of peak flows were observed at one station along the Lower Rouge River. Flows fell from within the acceptable tolerance range to below lower bounds at two stations, indicating a decrease in baseflow at those stations.

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