

5. Surface water: Summer Low Flows

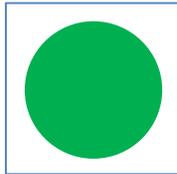
Target: Summer low flows are maintained or improve

About this indicator: Summer 7-day average low flow is the metric chosen to represent stream low flow conditions. Summer flows are a critical period for stream health.

Influencing factors: Amount of precipitation for a given year. Changes to the hydrologic pathways from development or modifications to the land cover. Changes to water demand.

2010 Target: Summer (July-October) low flows are maintained or improved.

2010 Finding: 4 sites – 2010 data for all sites are within historic mean flows



2010 Status: Four sites have flow monitored continuously on Vashon-Maury Island – Shinglemill, Tahlequah, Fisher and Judd Creeks, Figure 1. The summer low flow data for all sites are within one standard deviation of the historic mean. Sites are assessed green when within one standard deviation of the mean or above; yellow when below one standard deviation and red when below two standard deviations of the historic mean, Table 1. Figure 2 is an example of a control chart of 7-day average low flow for Judd Creek.

Under the Water Resources Act of 1971, Washington State Department of Ecology is authorized to “establish minimum water flows or levels for streams, lakes, or other public waters for the purposes of protecting fish, game, birds, or other wildlife resources, or recreational or aesthetical values of public waters. Judd, Shinglemill, Fisher and Christensen Creeks have been designated as closed basins by Ecology to preserve flows, Figure 1. Judd Creek was closed in 1951 on the basis that there were no waters available for further appropriation for consumptive use. Christensen, Fisher and Shinglemill Creeks were closed in 1981 on the basis of the need for high instream flow for anadromous fish.

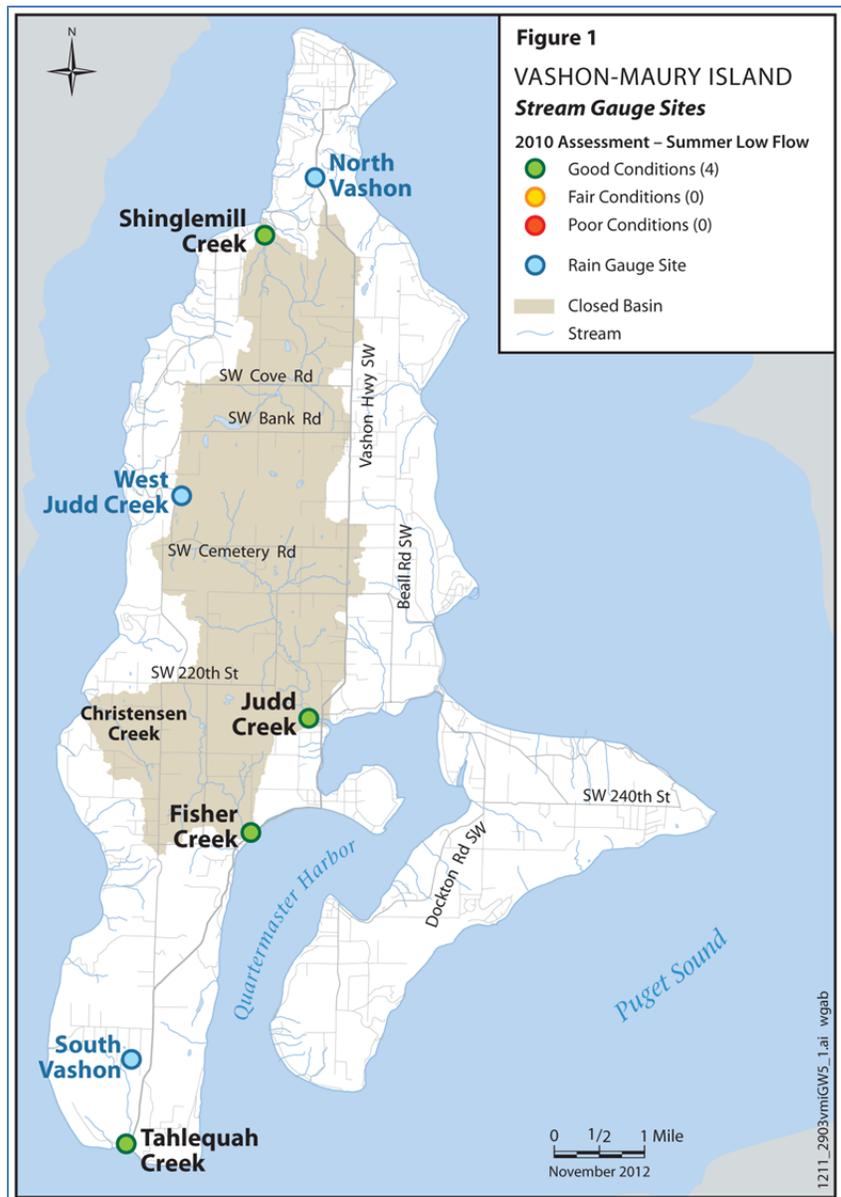
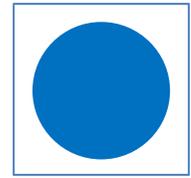


Figure 1. Stream gauge locations used in this indicator. Four sites have flow monitored continuously on Vashon-Maury Island – Shinglemill, Tahlequah, Fisher and Judd Creeks. Summer 7-day average low flow is the metric chosen to represent low stream flow conditions. All sites maintained or improved in 2010. Four basins (Shinglemill, Christensen, Fisher and Judd Creeks) have been designated by Ecology as closed to preserve flow.

2001-2010 Target: Summer low flows are maintained or improve

2001-2010 Assessment: All sites maintained or improved in 2010



2001-2010 Status: Three of the four sites (all but Tahlequah) show changes in summer low flows that reflect changes in total amount of precipitation when looking over the last ten years; 2001-2010, Figure 3. Tahlequah has maintained the same flows for the last five years and doesn't show the same pattern that reflects total rainfall as the other sites.

Table 1. Summer low flow data for 4 creeks on Vashon-Maury Island. Data are presented as 7-day low flow for July through October for each Water Year 2001-2010. Sites are assessed green when within one stand deviation of the mean or above; yellow when below one standard deviation and red when below two standard deviations of the historic mean. Location of each site are shown in Figure 1. Units are cubic feet per second (cfs).

Creek\Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Judd	1.4	1.5	1.3	1.2	1.2	1.2	1.5	1.3	1.1	1.4
Shinglemill	1.4	1.4	1.5	1.5	1.4	1.6	1.8	1.4	1.4	1.4
Fisher	—	—	—	—	0.4	0.4	0.6	0.3	0.4	0.4
Tahlequah	—	—	—	—	0.1	0.2	0.2	0.2	0.2	0.2

Monitoring began on Fisher and Tahlequah Creek in 2005; Judd Creek in 2000 and Shinglemill Creek in 1999.

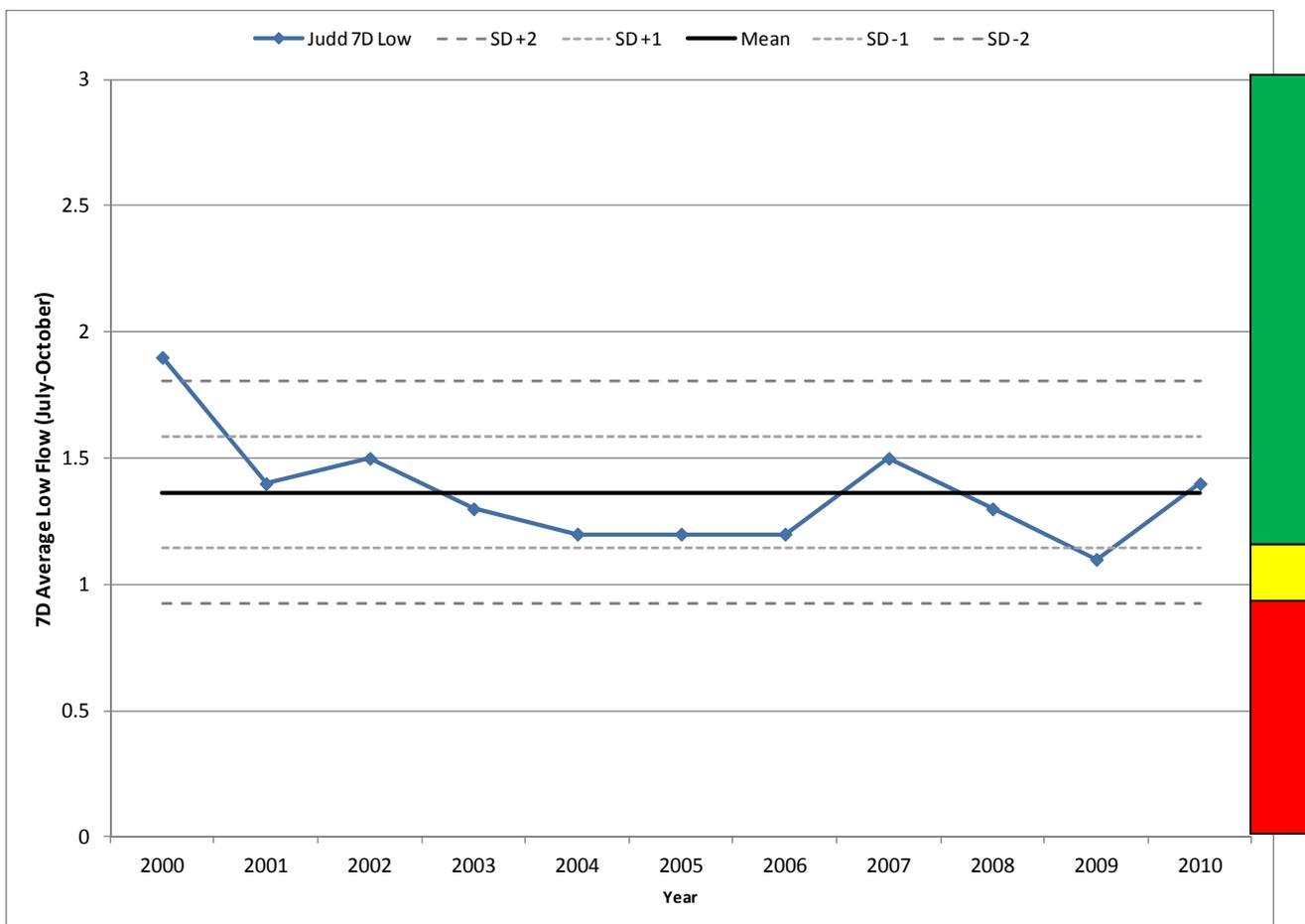


Figure 2. Control chart for Judd Creek. Data presented as 7-day low flow for July through October for each Water Year since data collection started. Solid line is the mean of all historic data. Dashed lines are standard deviations (SD) from the mean. Increasing values represent more flow. Assessment colors are shown for reference and are explained in greater detail within technical notes section. Units are cubic feet per second.

Technical Notes Surface Water: Summer Instream Flows

Data source: The data for this indicator comes from King County Water and Land Resources Division.

Collection frequency: King County has been monitoring stream flow continuously at four sites since 2005 – Shinglemill, Judd, Fisher, and Tahlequah Creeks. Shinglemill and Judd Creeks have been monitored since 1999 and 2000, respectively.

Methods for analysis: A 7-day low flow for a stream is the average flow measured during the 7 consecutive days of lowest flow during any given year. The summer period is assessed as July through October. The minimum flow for the summer period is recorded and tracked year to year, Figure 3. Sites are assessed 'green' when within one standard deviation of the mean or above; 'yellow' when below one standard deviation and 'red' when below two standard deviations of the historic mean, Table 1.

Data Reliability and Quality: The data quality of this indicator is high based on the KC SAP/SOP of the data collection. The reliability is good based on the consistent and regular collection of the data. Vashon-Maury Island has over 70 stream basins. Judd, Shinglemill, Fisher, and Tahlequah Creeks are the four largest basins representing 32% of the total area of the island.

Data Reference: King County Water Resources Evaluation Project – Data Reports 2005-2010.

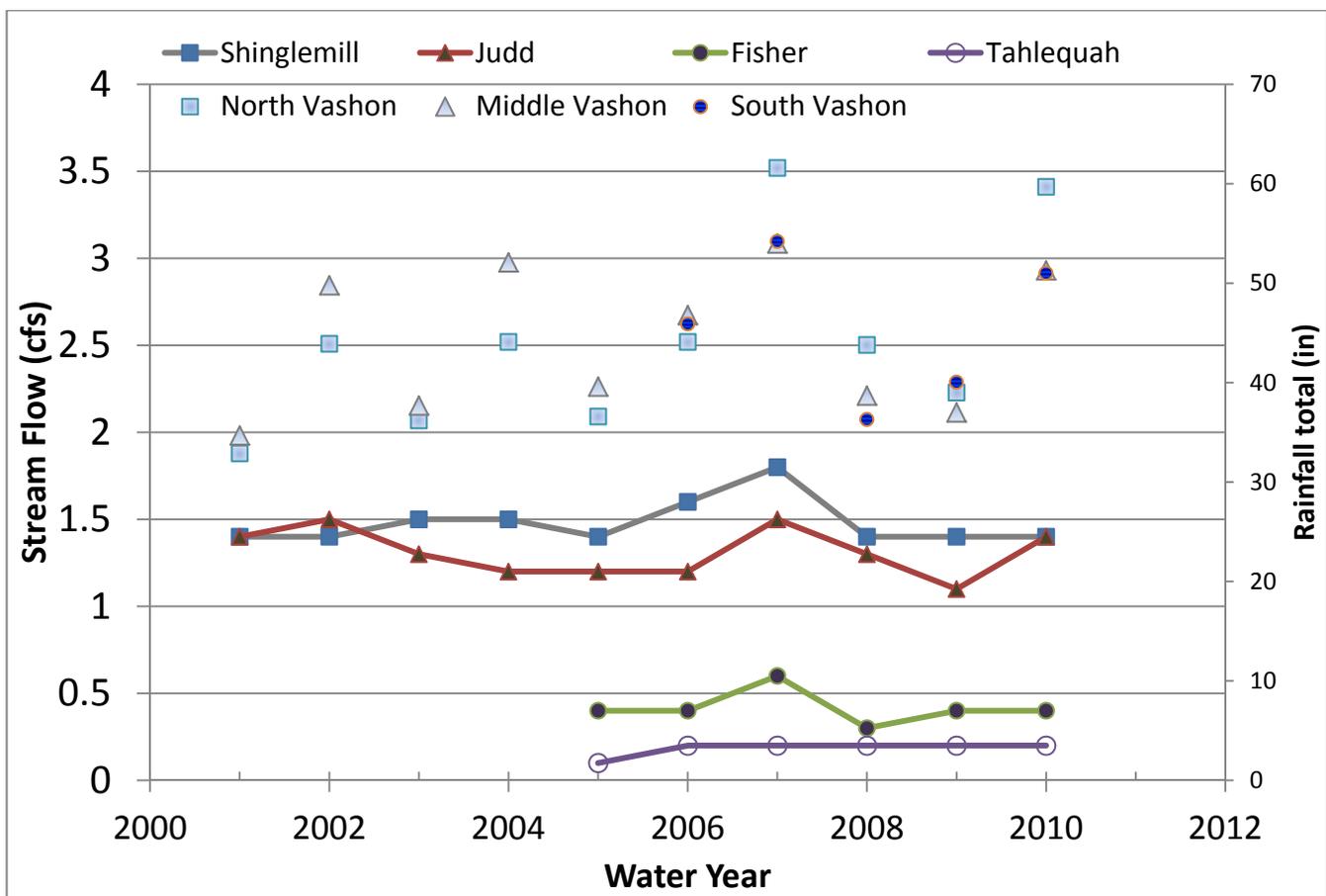
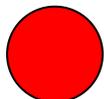


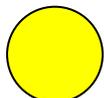
Figure 3. Summer low flow data for 4 creeks on Vashon-Maury Island. Data are presented as 7-day low flow for July through October for each Water Year 2001-2010. Increasing values represent more flow. All sites improved or maintained in the last two years (2009-2010). Rainfall totals (inches per water year) are shown on the second axis for three (North, Middle and South) precipitation sites on Vashon Island.

Legend

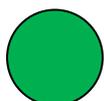
2010 Finding



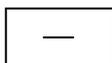
Poor Conditions: Reported data are above Maximum Contaminant Level (MCL) and/or fails to meet the state standard or criteria for a given indicator; needs improvement.



Fair Conditions: On average, data fell between the standard or criteria for “poor” and “good” and may be variable.

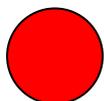


Good Conditions: Reported data are below MCL and/or meet the state standard or criteria for a given indicator.



No Annual Assessment

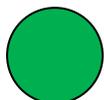
2001-2010 Status



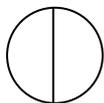
Downward Trajectory: 2001-2010 data shows decreasing or worsening conditions



No Change: 2001-2010 data shows no change with time.



Upward Trajectory: 2001-2010 data indicate increasing or improving conditions



Insufficient Data: reported data has too few data points and/or too short a period

