PUGET SOUND
VITAL SIGNS

INDICATOR
SUMMER LOW FLOW IN STREAMS AND RIVERS

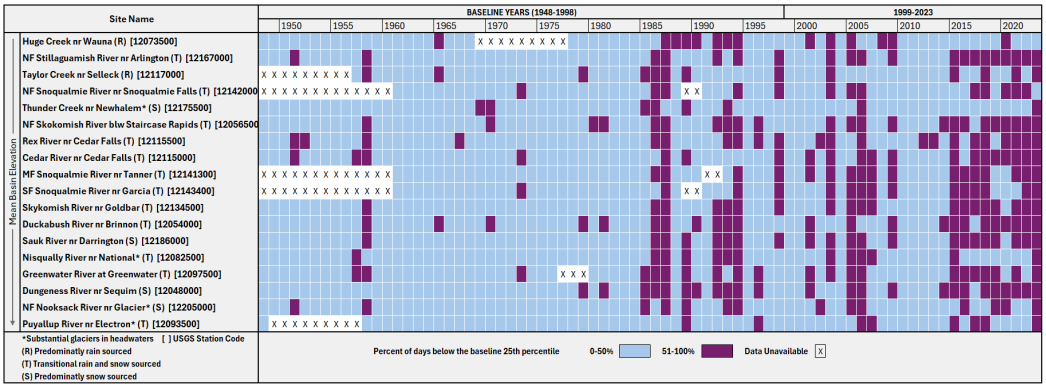
The summer low flow indicator measures current conditions and long-term trends in streamflows that occur during summer months when there is less rain and temperatures are warmer. The indicator tells us how often summer flows are below normal, relative to a 50-year baseline, in unregulated streams and rivers across Puget Sound. When flows are below normal, less water is available for people and wildlife to use, less habitat is available for salmon, and it can contribute to increased water temperatures and lower water quality.

Indicator Progress

GETTING WORSE

Target Status

NO TARGET



Status of annual summer low flow at indicator streamgages. Each cell is color coded for a category of frequency of below normal flow. Categories are based on the percentage of days each year between July 15th and October 31st where the 7-day mean daily flow was below normal (i.e., below the 1948-1998 baseline 25th percentile). When most days (50% or more) were below normal, the cell is shaded purple. When fewer than 50% of the days were below normal, the cell is shaded blue. Streamgages are highlighted as 1) (R) rain sourced, 2) (T) transitional (between rain and snow sourced), or 3) (S) snow sourced. Streams with substantial glaciers in their headwaters are denoted with an asterisk. Streams are arranged in order from streams with lowest mean basin elevation to highest.

Key Vital Sign Indicator Results

- The occurrence of below normal summer flows is increasing in unregulated streams and rivers across Puget Sound. In 2023, summer flows were below normal most of the time at 16 of the 18 indicator gages (see Interpretation of Results for more details). **Thus, we determine this indicator to be GETTING WORSE.**
- Consecutive years with below normal summer flows have increased since 1985 and especially since 2015. Since 2015, most of the rain, transitional, and snow-fed watersheds had below normal summer flows over 60% of the time.
- Accelerated glacial melt may temporarily offset diminishing low flows in some rivers. Summer flows are enhanced by glacier meltwater at four of the indicator gages. These systems have generally fewer occurrences of below normal flows during the summer flow period.
- Flows below 1948-1998 baseline minimums were observed at least once at all indicator gages during the 1999-2023 study period. The occurrences of flows below baseline minimums have increased since 2015. In 2023, 7-day mean daily flows below baseline minimums occurred greater than 50 percent of the time at 9 of the 18 gages in the analysis.
- Supporting analysis shows that the timing of streamflow is changing in Puget Sound. Between 1948 and 2023, the center of timing (CT) at most indicator gages regressed to earlier occurrences over time. This means the low flow season in our region is becoming longer as larger fractions of total annual runoff occur progressively earlier in the year (see Interpretation of Results – Changes in Streamflow Timing for more details).

Target

No targets are currently set for this indicator.

Data Source

U.S. Geological Survey Groundwater and Streamflow Information Program - Streamgaging Network, compiled by the Streamflow Monitoring Program at the Washington Department of Ecology

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CONTRIBUTING PARTNERS

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