Stream Flow

Summary

Declining

10 of the 17 rivers we studied showed decreasing summer flow trends since 1975. Five of the remaining seven rivers showed only minor increases or decreases in flow.

The Salish Sea is an ecosystem defined by the movement of water. Freshwater begins as rain or snow in the Cascade and Olympic mountains. It flows in streams down through fertile valleys and into a complex network of salt marshes, wetlands, and bays.

Low flow in our streams and rivers occurs during summer months when there is less rain and warmer temperatures, and the snow-pack has been depleted.

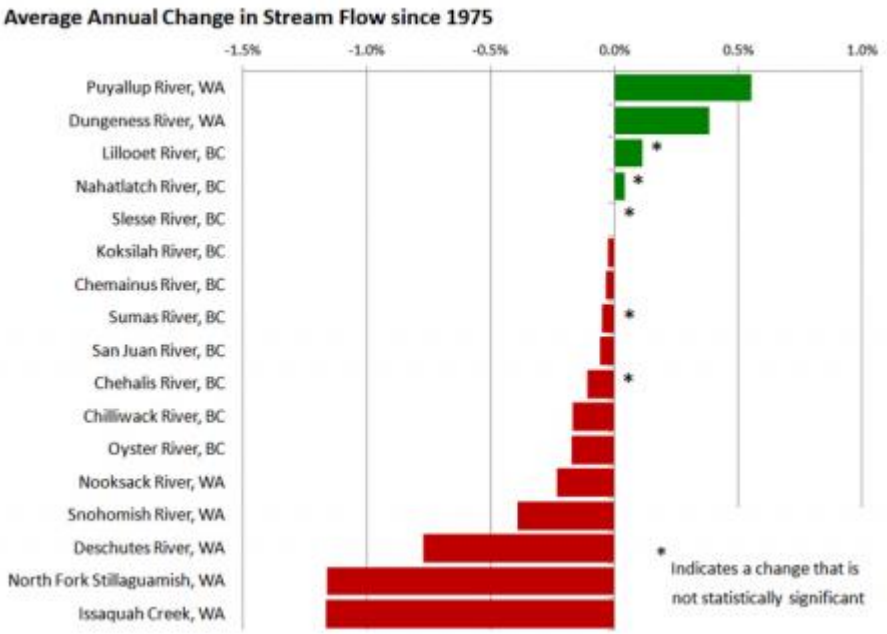
These low summer flows can affect salmon runs, wildlife, and our residential, agricultural and industrial water supplies.

Learn how we measure low flows

What's happening?

Low flow in our streams and rivers occurs during summer months when there is less rain and warmer temperatures and the snow-pack has been depleted through spring melt.

Since 1975, 10 of the 17 rivers we studied showed strongly significant decreasing summer flow trends. Five of the remaining seven rivers showed weaker increasing or decreasing in flow over the 35 year study period (see chart below).



The remaining two rivers that showed strongly increasing flow trends (Puyallup and Dungeness) have upper tributaries that are fed by glaciers or snow fields high in the mountains. The increased flow in these rivers may be due to glacial melting and recession.

Also, the most recent low flow seasons have been associated with "La Niña" weather conditions resulting in two of the highest flows on record, which may have tipped some of the trends toward increasing.

Why is it important?

If summer flows continue to decline as demand for water continues to increase for uses such as drinking water and irrigation, there is potential for conflict between human and ecosystem needs. Low water flow is already a priority issue for salmon in 14 of the 19 Puget Sound Water Resource Inventory Areas.

Changes in stream flow are associated with shifts in salmon habitat, water temperature, nutrient availability, and sediment levels. These changes can impact both human uses and the life cycles of salmon and other aquatic life.

Sustainable Perspective

Shallow groundwater wells withdraw water from the same aquifers that replenish wetlands and recharge streams.

In the Dungeness and Elwha River basins between 1986 and 2006, the number of wells increased by 275% while the population grew by only 28%. The average depth of these wells before 1986 was 114 feet, but new well depth increased to an average of 145 feet by 2006.

Population in the Dungeness and Elwha River basins is expected to grow by an additional 30% by 2026, suggesting a potentially unsustainable trend for water use. However, a water resource management rule was recently adopted to prevent further declines in flow resulting from ground water withdrawals.

Why is it happening?

Rainfall and snowmelt are the primary sources of water for rivers and streams in the Salish Sea, but many other factors can also impact stream flows, including:

- Dams and other hydrological modifications.
- Loss and change of vegetative cover.
- Surface and ground water withdrawals for municipal, domestic, commercial, industrial, and agricultural water supplies.
- Wells that tap ground water.
- Over-allocation of water rights.
- New buildings, roads, and parking lots that prevent water from percolating into the ground and slowly recharging streams throughout the summer.

Climate can also affect trends. However, declining flow trends in the Salish Sea are more likely associated with human-caused watershed impacts since recent climate patterns (including trends in the *Pacific Decadal Oscillation* and two strong La Niña years) would be expected to increase stream flows rather than decrease flows.

Learn more about why it's happening

What are we doing about it?

Streams and rivers are being closely monitored to help forecast low flow conditions. Actions that are already underway in both Canada and the U.S. that will help address this complex issue include water conservation programs, promoting sustainable development, and long range planning.

Learn more about what we're doing

Five things you can do to help

1. Fix your leaks! An average home can waste more than 10,000 gallons of water every year due to running toilets, dripping faucets, and other household leaks. Visit EPA's Fix a Leak Week page for tips on where to look for leaks.
2. Consider water efficiency next time you buy new products like washing machines, dishwashers, refrigerators, taps, and toilets.
3. An average home devotes 30% of its daily water consumption to outdoor uses. Water your lawn deeply but infrequently – the rule of thumb is one inch per week. Find a certified irrigation professional to install, maintain, or audit your home's irrigation system to ensure it is watering at peak efficiency. Switching to drought tolerant grasses or letting the lawn go dormant during the summer can also save significant amounts of water.
4. Use techniques such as natural landscaping, rain gardens, rain barrels, green roofs and permeable paving that conserve water and allow rain to soak into the ground.
5. Since agriculture has the highest water use, communities and local governments can encourage efficient water use for both individual gardens and larger farms.

Learn more about this topic

The following links exit the site EXIT

- U.S. Geological Survey Water Data for Washington
- Washington Dept. of Ecology river and stream monitoring
- Puget Sound Partnership Vital Signs
- Northwest Indian Fisheries Commission State of Our Watersheds
- Canada Real-time Hydrometric Data
- British Columbia River Forecast Centre
- British Columbia Living Water Smart

Scientific references

The following links exit the site EXIT

1. Snover, A.K., P.W. Mote, L.C. Whitely Binder, A.F. Hamlet, and N.J. Mantua. 2005. Uncertain Future: Climate Change and Its Effects on Puget Sound (PDF) (37pp, 4.6MB). Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington.
2. Snover, A.K., P.W. Mote, L.C. Whitely Binder, A.F. Hamlet, and N.J. Mantua. 2005. Uncertain Future: Climate Change and Its Effects on Puget Sound. Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington.
3. Mote, P.W., and E.P. Salathé. 2010. Future climate in the Pacific Northwest. Climatic Change 102(1-2): 29-50, doi: 10.1007/s10584-010-9848-z.
4. Elsner, M.M., L. Cuo, N. Voisin, J. Deems, A.F. Hamlet, J.A. Vano, K.E.B. Mickelson, S.Y. Lee, and D.P. Lettenmaier. 2010. Implications of 21st century climate change for the hydrology of Washington State. Climatic Change 102(1-2): 225-260, doi: 10.1007/s10584-010-9855-0.
5. Mote, P.W., A. Petersen, S. Reeder, H. Shipman, and L.C. Whitely Binder. 2008. Sea Level Rise in the Coastal Waters of Washington State. Report prepared by the Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington and the Washington Department of Ecology, Lacey, Washington.

More references

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