Sensitivity of Puget Sound’s water quality to climate and physical drivers

Washington State Department of Ecology

Long-term marine monitoring program

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- Monitoring status and trend of 16 water quality indicators monthly at 37 station since 1973
Pacific Decadal Oscillation and upwelling are important drivers of Puget Sound water quality.
Droughts increase human burden on water quality

**Land Ocean Interactions**

1. Consistent upwelling (northerly winds)
2. High Fraser River flows
3. Lower tidal mixing over sills
Upwelled water keeps Puget Sound cool.

Years with cool, nutrient rich water are good for fish.

High number of schooling fish. On the image, we count more than 85 schools (marked with white vertical lines).

Location: Case Inlet (South Sound), 12:05 PM
Freshwater response to climate

Ecology’s 20-year river flow and temperature trends

- 20 years of monitoring confirms changes in timing of FW delivery
Upwelling and peak freshwater input align in summer
Climate River Hydrology Stratification

6-17-2021
Puyallup River plume

Qualitative IR image showing spatial temperature patterns
Climate change drives higher stratification

More stratified

Spearman Rank Correl Coeff. Rho= -0.45

Anomalies (-D PE, km²)
Impacts of low river flow on phytoplankton

Ecology’s 20-year river flow and 2019 Puget Sound phytoplankton

Change in Chl a (mg m^-2)

Spearman Rank Correl Coeff. Rho = 0.7, N=12, p<0.05
Climate change impacts on Freshwater systems are cascading through the Puget Sound, which we only know thanks to extensive long-term monitoring efforts.