

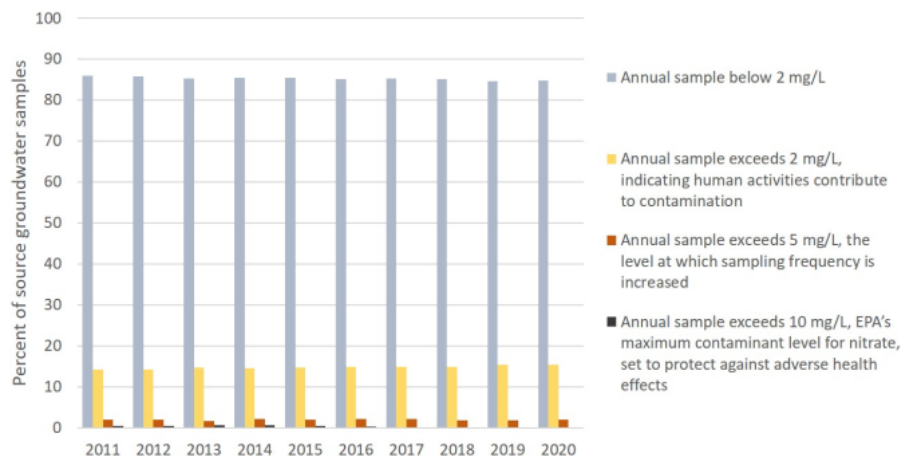
# PUGET SOUND VITAL SIGNS

## INDICATOR NITRATE CONCENTRATION IN SOURCE WATER

This indicator measures the ecosystem's ability to provide clean drinking water by tracking the concentration of nitrate in groundwater, before water enters public drinking water systems (raw groundwater, pre-treatment). Nitrate occurs naturally in groundwater but is also a widespread chemical that can cause adverse health effects if consumed in too large amount. The detection of elevated concentrations of nitrate may help identify areas that are at greater risk of groundwater contamination.

Indicator  
Progress

Indicator  
Status



The percent of raw groundwater sources for Group A systems across Puget Sound with annual nitrate concentrations below 2 mg/L, and exceeding 2 mg/L, 5 mg/L, and 10 mg/L. Nitrate concentrations below 2 mg/L reflect levels found in natural ground waters (away from impacts related to human activities).

### Recovery Target

No targets are currently set for this indicator.

### Data Source

Washington State Department of Health, Water System Data [Sentry Database](#)

### Indicator Lead

Brian Walsh  
[brian.walsh@doh.wa.gov](mailto:brian.walsh@doh.wa.gov)  
 Washington State Department of Health

### Last Updated

4/1/2021

## Key Vital Sign Indicator Results

- The vast majority of Puget Sound residents get their drinking water from public water supply systems. Nearly 98% of the Puget Sound population is served by large systems known as Group A water systems, which have more than 14 connections or serve 25 or more people 60 or more days per year; over half of these people receive water sourced primarily from groundwater supplies.
- Nitrates occur naturally in groundwater but are also found in fertilizers, animal manure and waste from septic systems, which may greatly increase nitrate concentration in groundwater. If consumed in too large amount, nitrates pose a health risk. The Safe Drinking Water Act nitrate limit for delivery of water from public water systems, set to protect against adverse health effects, is 10 mg/L.
- Most groundwater in Puget Sound is not contaminated by nitrates. Across Puget Sound, the average concentration of nitrate in source groundwater (pre-treatment) remained at low levels from 2011 to 2020. Concentrations of nitrates above 2 mg/L in groundwater supplies indicate human activities are the source of the contaminant (Nolan et al., 1998). Regionally, the annual median concentration ranged from 0.25 to 0.50 mg/L meaning that the majority of groundwater sources to public water systems do not show signs of human caused nitrate pollution. Approximately 15% of groundwater samples collected each year have nitrate concentrations above 2 mg/L.
- In most years, only 2% of groundwater samples exceed 5 mg/L. For these water sources, samples are taken more frequently to ensure concentrations stay “regularly and consistently” below 8 mg/L.
- If nitrate concentrations exceed 10 mg/L, the system must notify customers and install expensive treatment systems in order to provide clean water to the public. Five Group A water systems in Puget Sound treat water for nitrate contamination: four in Whatcom County and one in Island County.
- Whatcom, Island and Clallam counties had a higher proportion of source groundwater samples with nitrate concentrations above 5 mg/L relative to other Puget Sound counties (see [Interpretation of Results](#)). Widespread and decades-long nitrate contamination, primarily from manure applied to crops and fertilizers, has been well documented in northwestern Whatcom County groundwater. Education and outreach is ongoing in this county to address nitrate pollution. Potential areas to watch for increasing nitrates are in Pierce and Thurston county.
- Given that the amount of nitrate in groundwater is generally stable across Puget Sound watersheds, progress for this indicator is assessed as 'not improving'. The indicator is generally in good condition, with few known areas of elevated nitrate levels in groundwater.

## Contributing Partners

