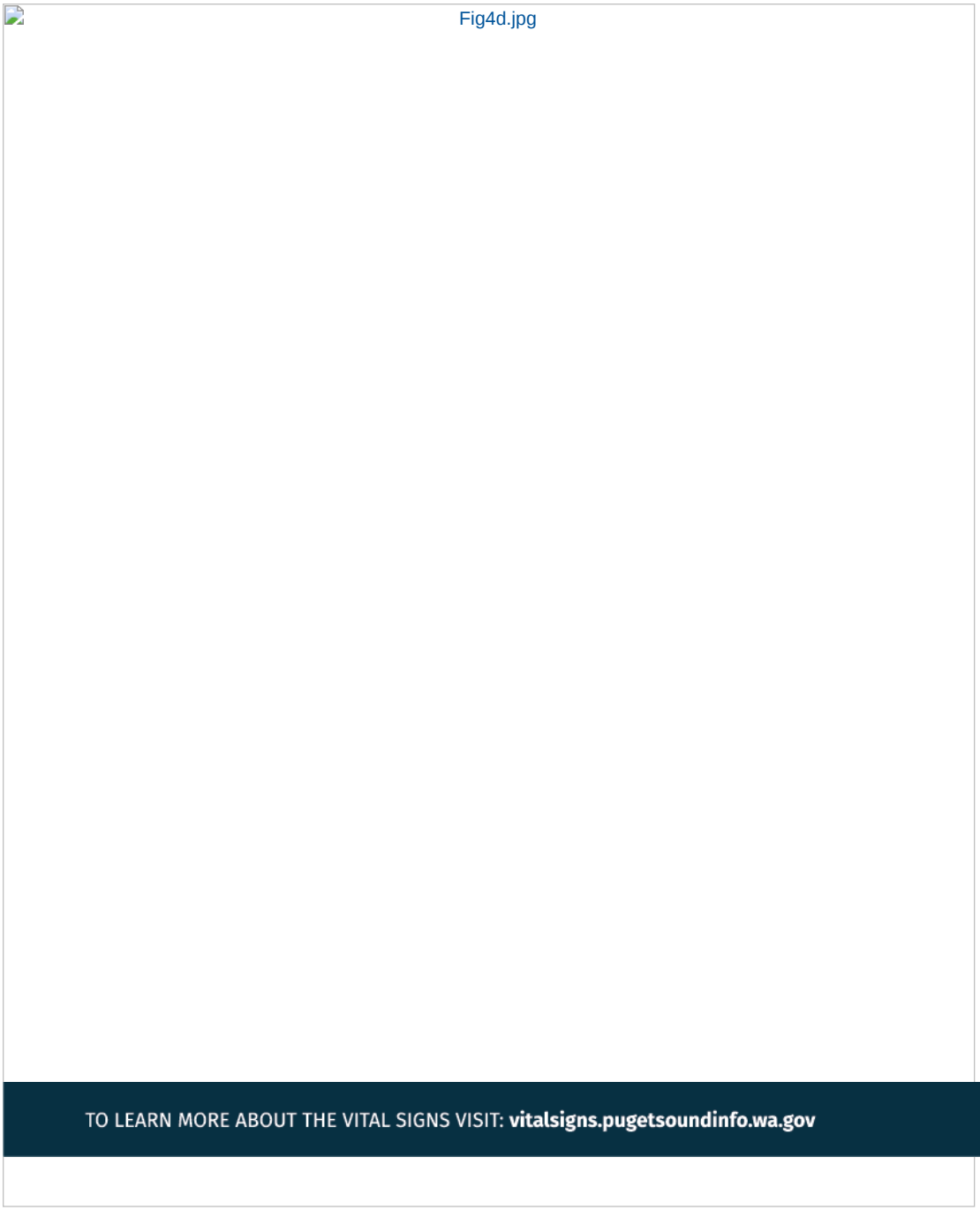
PUGET SOUND
VITAL SIGNS

INDICATOR
INDEX OF VULNERABILITY FOR ELEVATED NITRATES IN GROUNDWATER

This indicator estimates the likelihood of elevated nitrate concentrations in groundwater throughout Puget Sound. Elevated nitrate concentrations are typically caused by human activities and can impact drinking water and human health. The modeled results represent all areas in the Puget Sound region, including tribal and rural communities with limited data, to identify areas that are vulnerable to groundwater contamination.



The probability of exceeding nitrate concentrations of 2 milligrams per liter (mg/L) in 150-foot-deep wells between 2015 and 2019. The most vulnerable groundwater to elevated nitrates are located near areas of high population densities or increased agricultural activity. Probability maps do not represent actual nitrate contamination of

Indicator Trend

MIXED RESULTS

Target

No targets are currently set for this indicator.

Data Source

U.S. Geological Survey Scientific Investigations Report (Black et al. 2023) and Data Release (Wright et al. 2023)

Washington State Department of Health, Water System Data Sentry Database

Vital Sign Indicator Reporter

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Indicator Details

Click below for more information about this indicator, including Maps, Charts, Indicator Importance, Methods, Interpretation of Results, and Additional Resources.

Complete Indicator Report

Last Updated

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groundwater. Areas of high probability on the map have high potential for nitrate contamination but are not necessarily contaminated.

Key Vital Sign Indicator Results

- Most of Puget Sound is at low risk for elevated nitrate concentrations in groundwater. Modeled probabilities show that for more than 75% of the Puget Sound basin area, the risk of elevated nitrate concentrations is less than 10%.
- However, relatively high probabilities are estimated for several Puget Sound lowland locations. The most vulnerable groundwater to elevated nitrates (highest probability of having nitrate concentrations equal to or greater than 2 mg/L) are located near areas of high population density or increased agricultural activity.
- Nitrate vulnerability is lower in deeper groundwater. This means that as well depth increases, the probability of elevated nitrate concentrations decreases. Nitrate contamination on ground surfaces is less likely to reach deeper groundwater due to physical or chemical processes.
- From 2000 to 2019, the highest probabilities of finding elevated nitrate concentrations have steadily increased. This is the result of more locations having the highest probabilities of elevated nitrates (greater than 70% probability) and an increase in probabilities of those areas that already have high probabilities. The areas with these increases in nitrate vulnerability occur in approximately 1% of Puget Sound groundwater but are generally located in populated or agricultural areas. In contrast, groundwater with a moderate probability of elevated nitrates (25 to 70%) generally saw decreasing trends in probabilities between 2000 and 2019.
- This indicator and the probability maps do not represent actual nitrate contamination of groundwater. Rather they help us understand where conditions occur that increase the probability of elevated nitrate concentrations.

CONTRIBUTING PARTNERS

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Washington State Department of Health