

## 1A. Groundwater Quality — Nitrate

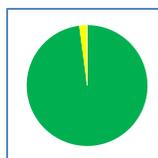
### Target: Drinking Water below the Maximum Contaminant Level (MCL)

**About this indicator:** Nitrate is one of three parameters selected as an indicator of groundwater quality because it can track changes caused by human activities. High nitrate levels can cause methemoglobinemia (blue baby syndrome) especially in infants under six months. The MCL for nitrate is 10 milligrams per liter (mg/L).

**Influencing factors:** Leaching from septic systems, runoff from fertilizer or manure and nitrogen fixing vegetation such as alder trees can influence the measured concentration of nitrate in groundwater.

**2010 Target:** Groundwater quality meets drinking water quality standards (test results are below the MCL).

**2010 Finding:**  
No sites above MCL



**2010 Status:** No nitrate results were reported above the drinking water standard (MCL of 10 mg/L). Four sites have nitrate values between 5 to 10 mg/L (half of the MCL up to the MCL). The remaining 186 locations had result values below 5 mg/L.

Maximum result values for nitrate data collected at 190 locations (155 public water sources and 35 long-term monitoring sites) from 1990 to 2010 is presented in Figure 1.

**Other Drinking Water Standards:** The United States Environmental Protection Agency sets drinking water standards and MCL's for over 95 parameters including microorganisms, disinfectants & their byproducts, inorganic chemicals, organic chemicals and radionuclide's.

Review of the public drinking water source data for Group A water systems available from the Washington Department of Health Drinking Water Program from 2008 to 2010 found no value above the MCL for the other 92 regulated parameters.

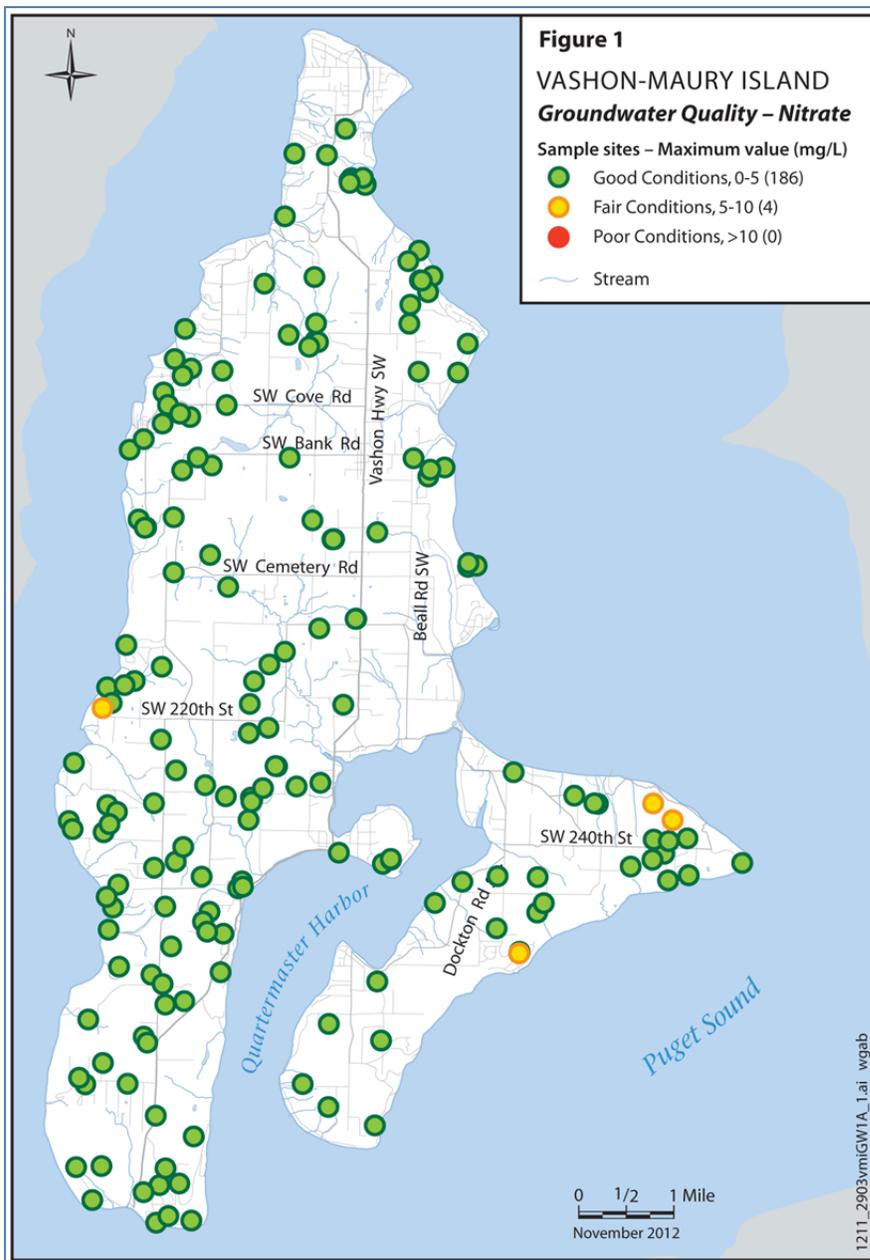


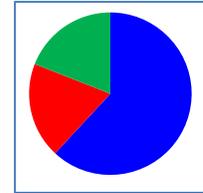
Figure 1. Maximum nitrate results from 1990 to 2010 for 190 locations. No sample results are above the MCL of 10 mg/L. Four sites have results between 5 – 10 mg/L while the remaining 186 sites have result values below 5 mg/L.

**Trend Target:** For locations with more than 10 years of water quality samples, new data will be compared to the baseline period to evaluate changes through time. Water quality changes that would trigger further evaluation were defined in the Vashon-Maury Island Ground Water Management Plan management strategies as follows:

1. Any increase in the sampled contaminates level greater than 10% over the baseline for two or more years;
2. Any trend that increases from zero to one quarter of the MCL or reaches one half the MCL limit.

**Trend Finding:**

**21 sites; 4 increasing, 4 decreasing, 13 unchanged from 1990 to 2010**



**Trend Status** Four of 21 sites had an increase when comparing averaged 2009-2010 data to their baseline (1990-2008), Figure 2. Four other sites had a decrease when comparing averaged 2009-2010 data to their baseline while the remaining 13 sites had no change between recent and baseline values.

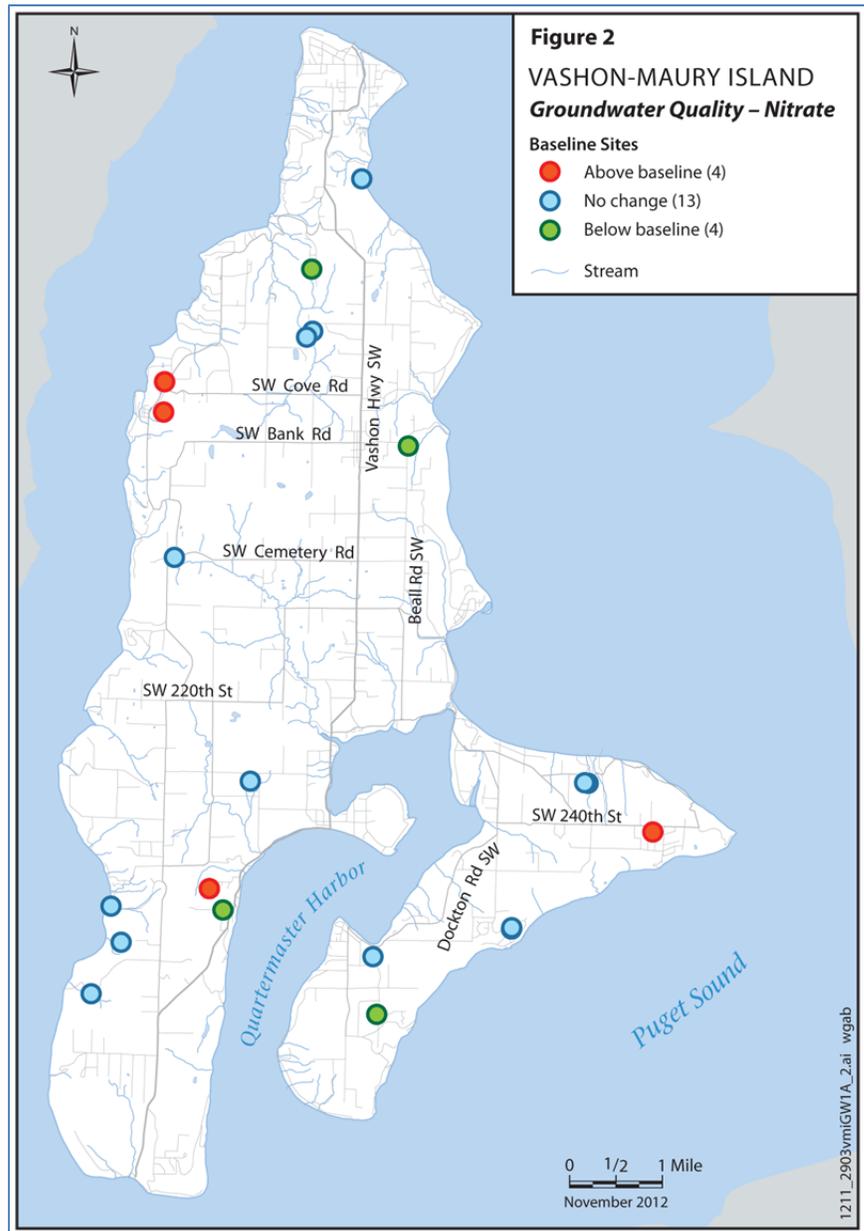
Figure 2. Baseline assessment locations. Twenty-one locations had sufficient data to assess the recent data (2009 & 2010) to a baseline (>10 year) average evaluating for change. Four sites had increases in recent data compared to baseline, four additional sites had lower values recently and the remaining 13 sites had no change comparing recent to baseline data.

**Technical Notes: Nitrates in Groundwater**

**Data source:** The data for this indicator comes from multiple sources including VMI water purveyors, King County WLRD Groundwater Protection Program, Public Health - Seattle & King County Drinking Water Program, and Washington State Department of Health Office of Drinking Water.

**Collection frequency:** King County has been monitoring nitrate concentrations annually on Vashon-Maury Island since 2001 and monitored 21 and 22 locations during 2009 and 2010, respectively. Department of Health – local and state require annual nitrate testing of public water system sources. Department of Health reported data from 31 and 43 public water sources in 2009 and 2010, respectively.

**Methods for analysis:** Each result is compared to the drinking water standard. Baseline assessment was completed for 21 public water sources that had at least 10 years from 1990 to 2008. Thirteen of these had no change, four sources had decreases and four had increases when comparing an averaged 2009 and 2010 data to their baseline.



**Data Reliability and Quality:** The data quality of this indicator is high based on the SAP/SOP of sample collection. The reliability is fair to good. Data reliability from the sources can and does vary. King County has monitored 35 locations for nitrate which represents about 4% of the over 1000 wells on VMI. Department of Health reported arsenic data from 155 public water sources which is 78% of the island's 200 public water sources.

**Data Gaps:** Collection of historic monitoring data directly from the public water purveyors might expand the data set sufficiently to permit extended trend analysis for many of the 71 public water sources.

**Data Reference:**

King County - Water Resources Evaluation Project – Data Report 2005-2009.

<http://www.kingcounty.gov/environment/waterandland/groundwater/management-areas/vashon-maury-island-gwma/vashon-island.aspx>

Washington State Department of Health – Sentry - database of public water systems (1990-2010).

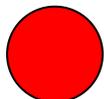
<https://fortress.wa.gov/doh/eh/portal/odw/si/Intro.aspx>

Washington Administrative Code (WAC) — 173-200 Water quality standards for groundwater

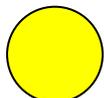
Arsenic (1B) and Chloride (1C) were selected for the other groundwater quality indicator parameters.

## Legend

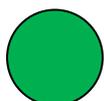
### 2010 Finding



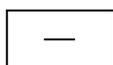
**Poor Conditions:** Reported data are above Maximum Contaminant Level (MCL) and/or fails to meet the state standard or criteria for a given indicator; needs improvement.



**Fair Conditions:** On average, data fell between the standard or criteria for “poor” and “good” and may be variable.

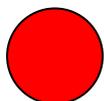


**Good Conditions:** Reported data are below MCL and/or meet the state standard or criteria for a given indicator.

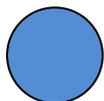


**No Annual Assessment**

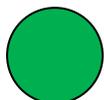
### 2001-2010 Status



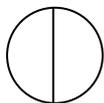
**Downward Trajectory:** 2001-2010 data shows decreasing or worsening conditions



**No Change:** 2001-2010 data shows no change with time.



**Upward Trajectory:** 2001-2010 data indicate increasing or improving conditions



**Insufficient Data:** reported data has too few data points and/or too short a period

