

Nitrate in the Environment

Reference: http://www.gov.pe.ca/photos/original/eef_nitrate_env.pdf

Nitrogen is the most abundant element in the atmosphere and nitrate is one of the more common forms of nitrogen in the environment. It is an essential nutrient for plant growth, but too much nitrate can contaminate groundwater, which we use as a source of drinking water. Too much nitrate can also affect the quality of aquatic habitat such as our rivers, streams



WINTER RIVER - TRACADIE BAY
WATERSHED ASSOCIATION

and estuaries. There are many sources of nitrate in the environment, including deposition from the atmosphere, decomposition of plant and animal material, sewage, manures and chemical fertilizers. The relationship between these sources, and the mechanisms by which nitrate travels through the environment is complex (see Figure 1).

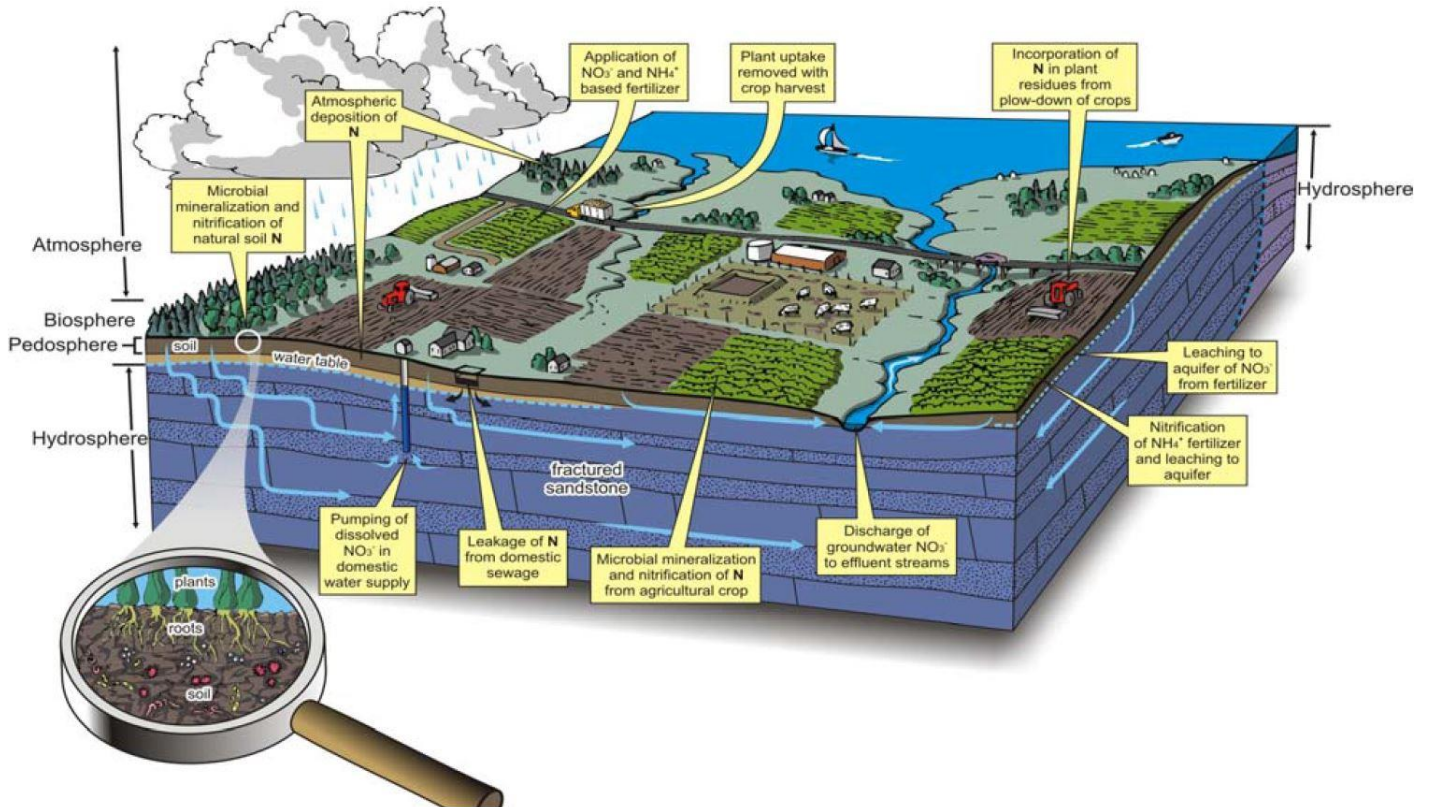


Figure 1. Nitrogen in the Environment.

Nitrate in PEI Groundwater

Groundwater is the sole source of drinking water in PEI, and it is recommended that nitrate levels in drinking water do not exceed 10 mg/L. Average nitrate levels in PEI groundwater range from low (0-2mg/L) in a relatively pristine environment, to levels approaching the 10mg/L limit in areas of more intensive agricultural activity (Figure 2). Across the Island, nitrate levels in about 4% of wells exceed the acceptable level, however, in some areas as many as 20% of wells may exceed this guideline.

In 2011, we analyzed 24 water samples for residents living near the Winter River and found an average of 5.3 mg/L of nitrates, but 4 residents had levels higher than the 10mg/L limit.

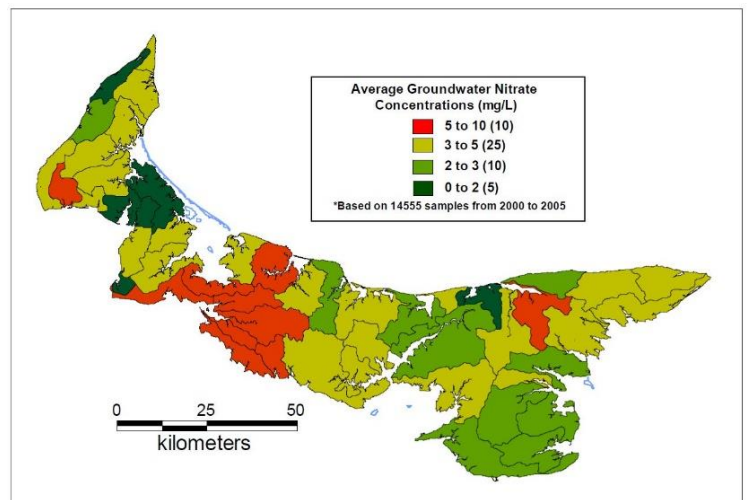


Figure 2. Average nitrate concentrations in PEI groundwater.

Nitrate in PEI Surface Waters

Nitrate plays an important role in the health of our fresh water bodies and also our estuaries. Nitrogen is one of the key nutrients for the growth of aquatic plants, and thus an important link in the food chain. Like anything else, however, there can be too much of a good thing.

Excessive nutrient levels, in combination with a number of other factors, can lead to an overabundance of some aquatic plant species in our estuaries. This rapid growth of some plant species upsets the natural balance of the ecosystem.

In addition, as this abundant plant material dies and decomposes, it consumes oxygen, sometimes stripping all of the oxygen from the water, causing the death of shellfish and plants and producing unpleasant odors.

Unlike drinking water, where levels of up to 10 mg/L are currently considered safe, levels as low as 1.5 to 2 mg/L can be of concern to some forms of aquatic life.

The “link” between nitrate in groundwater and nitrate in surface waters:

In PEI, there is a close link between groundwater and surface water. When precipitation falls to the ground, some of it evaporates, some runs off quite quickly into streams, ponds and the ocean and a large portion (about 30-35%) soaks into the ground and becomes groundwater. This groundwater in turn “discharges” slowly back to the surface through springs and directly into surface water bodies, and makes up almost two-thirds of the water we see in our fresh water streams on an annual basis. During dry times of the year, this groundwater discharge (often called “base-flow”) makes up almost all the water we see in our streams. When this discharging groundwater is rich in nitrate, it represents the dominant pathway by which nitrate from the land surface is transported to our water ways. Figure 3 shows the trend of nitrate transported from groundwater to surface water in five PEI river systems.

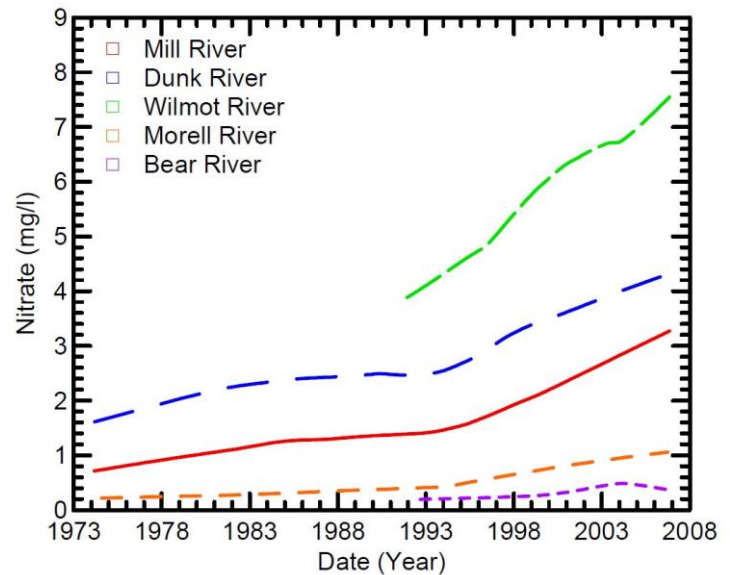


Figure 3. Historical trends for the concentration of nitrate in base-flow to 5 Island Rivers

The Future – Nitrate management on a watershed basis

Nitrate levels in both groundwater and surface water have been increasing over a long period of time, and it is unlikely that these trends can be reversed quickly. Researchers have been trying to determine the sources, behavior, and distribution of nitrate in the environment.

The Winter River-Tracadie Bay Watershed Association has been working with local farmers on a nutrient management pilot project to help reduce extra nitrates from entering the environment. We have inventoried most of the fields in the watershed to determine crops being grown. With this information it will be possible to determine the approximate nitrate loading from agriculture. To better analyze the concentration of nitrate in the water, we have monitored about 25 springs on a weekly or biweekly basis. A goal was to determine how much seasonal variability occurred in the water flowing from the springs.

We hope to continue working on the issue of nutrient management in the future, and to involve a greater number of landowners.

Homeowners play a role by properly maintaining their septic system. More information is online at: www.gov.pe.ca/photos/original/elj_sewage_gud.pdf

If you are interested in the nitrate levels in your water, more information about water testing on PEI can be found online at www.gov.pe.ca/environment/watertest

Contact Us

Mailing Address:
630 Suffolk Road
Dunstaffnage, PEI
C1C 0P6

www.WinterTracadie.ca

www.facebook.com/WRTBWA

Email: info@WinterTracadie.ca

