

MN State Envirothon 2017 – Water Resources

Water Resources Learning Goals

1. Nitrogen Cycle
 - a. Nutrient cycle through the environment
 - b. Where does the nitrogen go
2. Forms of Nitrogen in Water
 - a. Nitrate
 - b. Nitrite
 - c. Ammonia
 - d. Organic
3. Nitrate Impacts on Human Health
 - a. Methemoglobinemia
4. Nitrate Pollution Trends
 - a. Surface water
 - b. Ground water
5. Nitrate Pollution Sources and Impacts
 - a. Fertilizers
 - b. Organic
 - c. Septic
6. Testing Water for Nitrate
 - a. Township testing
 - b. Statewide testing
 - c. Historical data
7. Reducing Nitrate Pollution
 - a. Best management practices
 - b. Septic system design
 - c. Household fertilizer use
 - d. Cover crops

Nitrogen Cycle

<http://www.extension.umn.edu/agriculture/nutrient-management/nitrogen/docs/08557-southeastMN.pdf>

University of Minnesota -- Best Management Practices for Nitrogen Use in Southeast Minnesota – nitrogen cycle (Page 8)

Forms of Nitrogen in Water

<https://www.pca.state.mn.us/sites/default/files/wq-s6-26a.pdf>

Nitrogen in Minnesota Surface Waters – Forms of nitrogen in water (pages A2-1 to A2-3)

<https://www.pca.state.mn.us/sites/default/files/nitrate.pdf>

Minnesota Pollution Control Agency – Nitrate in Minnesota’s Ground Water – overview

Nitrate Impacts on Human Health

http://www.iaenvironment.org/webres/File/News%20%26%20Resources/Publications/Nitrate_in_Drinking_Water_Report_ES_Web.pdf

Iowa Public Health Report

<http://www.health.state.mn.us/divs/eh/hazardous/topics/sacnitrate.html>

Minnesota Department of Health Nitrates in Drinking Water

Nitrate Pollution Trends

<https://www.pca.state.mn.us/sites/default/files/wq-ws4-28a.pdf>

Mississippi River Winona Watershed – Watershed Restoration and Protection Strategy – Trends in nitrate (pages 29-32)

Nitrate Pollution Sources and Impacts

<https://www.pca.state.mn.us/featured/report-nitrogen-surface-water>

Minnesota Pollution Control Agency “Report on nitrogen in surface water – nitrate pollution sources and impacts

https://water.usgs.gov/nawqa/nutrients/pubs/wcp_v39_no12/

U.S. Geological Survey National Water-Quality Assessment Program – A national look at nitrate contamination of ground water – map showing area of greater groundwater contamination risk

Water Testing

<http://www.mda.state.mn.us/~media/Files/chemicals/nfmp/ttpupdate201702.pdf>

Minnesota Department of Agriculture Township Testing Program – Well Water Testing that is Underway

Reducing Nitrate Pollution

<https://www.pca.state.mn.us/sites/default/files/wq-s6-26a2.pdf>

Minnesota Pollution Control Agency – A2. Nitrogen in Waters: Forms and Concerns – Minnesota Water Quality Standards

<http://www.mda.state.mn.us/nfmp>

Minnesota Department of Agriculture Nitrogen Fertilizer Management Plan – reducing pollution from fertilizer/mitigation (page xi)

<http://www.extension.umn.edu/garden/yard-garden/lawns/fertilizing-lawns/>

University of Minnesota – Fertilizing Lawns

<http://www.doh.wa.gov/Portals/1/Documents/4450/337-142-Nitrogen-Removal-from-OSS-FactSheet.pdf>

Washington State Department of Health – How nitrogen from septic systems can harm water quality

<https://www.forevergreen.umn.edu/crops-systems/cover-crops/cover-crops-major-cropping-systems>

University of Minnesota – Forever Green Cover Crops for Major Cropping Systems