
BACKGROUND

CEMA's Interim Nitrogen (Eutrophication) Management Recommendations and Work Plan addresses potential nitrogen eutrophication (fertilization) issues associated with regional industrial emissions of nitrogen compounds. This document is presented as "interim" because additional studies and evaluations are necessary to develop a management framework that has specific nitrogen eutrophication based management criteria.

Nitrogen deposition to the environment resulting from urban, agricultural and industrial emissions of nitrogen oxides (NO_x) and/or ammonia (NH_3) can have a fertilizing effect on ecosystems, referred to as eutrophication. The critical load of nutrient nitrogen is defined as the highest load at which undesirable eutrophication effects do not occur, based on present knowledge. Nitrogen is a growth-limiting nutrient in most boreal ecosystems and natural habitats are characterized by slow-growing species adapted to low nitrogen conditions. With increased air-borne nitrogen deposition, these species may be out-competed by faster growing species more able to exploit increased nitrogen availability. This may result in loss of biodiversity and/or characteristic plant species. Loss of species diversity has been documented in the UK where current mean deposition is $20 \text{ kg N ha}^{-1} \text{ y}^{-1}$. Low to moderate deposition of nitrogen may result in increased primary productivity (biomass production); very high levels of deposition may cause reduced productivity. Reversal of this eutrophication process after anthropogenic nitrogen deposition ceases may take a very long time. Nitrogen deposition to terrestrial ecosystems at a rate greater than the uptake rate by vegetation will, over time, result in leaching of nitrogen into groundwater and/or surface waters and may cause both aquatic eutrophication and soil acidification. With the increasing NO_x emissions in the Regional Municipality of Wood Buffalo (RMWB) due to oilsands development, and based on the results of limited regional modeling and monitoring, nitrogen eutrophication has been identified as a potential environmental issue that should be addressed. The risk of nitrogen eutrophication impacts in the region is difficult to quantify and will in large part depend on the pace and nature of future oil sands development and the ability to control and minimize industrial nitrogen emissions.