

Fertilizer Use

What is the Issue?

Municipalities and cottage owners apply fertilizers during the summer months to stimulate and nourish the growth of park turf, sport fields, and private lawns and gardens. Improper (over) application and/or rainfall can cause fertilizer to run off into adjacent water where it can accelerate the production and growth of aquatic plants (macrophytes), algae, and cyanobacteria. It can result in algal and cyanobacterial blooms. These conditions are aesthetically unpleasant and can prevent recreational activities such as boating and swimming.

The impacts of fertilizer use are connected to land management practices. There is no provincial legislation regulating the use of fertilizer on private residential properties. It really is up to the Summer Village to be pro-active about this matter. Once Council is up to speed on how lake ecosystems work, and how fertilizers can affect this system, councillors can institute bylaws to regulate fertilizer use within the Summer Village.

Background

Trophic status refers to how productive the lake is and is an indicator of the amount of nutrients in a lake. Plant nutrients, such as phosphorus and nitrogen from chemical fertilizers, or from livestock wastes used as fertilizer, can accelerate the eutrophication of a lake, and thus change its trophic status. Most Alberta lakes already have naturally high concentrations of nutrients. For more information on the trophic status of lakes, see Appendix I - **Understanding Lake Basics**.

Carbon, nitrogen, and phosphorus are necessary for plant, algae, and cyanobacterial growth in aquatic environments. The supply of phosphorus is much more limited on earth than nitrogen is. Nitrogen comprises the majority of atmospheric gas surrounding earth. Some plants, including common bloom forming species of cyanobacteria, can fix atmospheric nitrogen for growth, so nitrogen is never in short supply for these plants. Phosphorus, however, is not available in the atmosphere, so phosphorus becomes the limiting nutrient for growth in aquatic environments. It is important to note however, that nitrogen is just as important as phosphorus for the growth of aquatic plants and algae - especially to those plants that cannot fix atmospheric nitrogen.

Phosphorus

Phosphorus is the primary nutrient that determines plant, algae, and cyanobacterial growth in aquatic ecosystems. A lack of phosphorus will limit their growth in freshwater, even if there is plenty of nitrogen. A very small amount of phosphorus (measured as parts per billion) in freshwater can cause cyanobacterial blooms and increased aquatic plant growth. Besides existing naturally in lake water and in the underlying sediments, phosphorus is found in fertilizers, manure, detergents, and sewage.

Surface runoff carries phosphorus from the land into streams and lakes. The phosphorus is either attached to eroded soil particles or dissolved in the runoff.

Phosphorus in runoff can cause excessive algal, cyanobacterial, and plant growth to occur. Blooms eventually collapse or die and start to decompose. During decomposition, dissolved oxygen is removed from the water by microorganisms that break down the organic material. The lack of dissolved oxygen can cause aquatic organisms, such as fish, to suffocate and die.

Nitrogen

Nitrogen is the primary nutrient required for plant growth on land, but is also essential for growth of aquatic vegetation. Organic matter in soil, chemical fertilizers, and livestock manure provide sources of nitrogen. Nitrogen, in the form of ammonium salts and nitrates (found in commercial fertilizers), is easily diluted in water and can move easily through the soil into shallow groundwater or be carried into the lake with runoff.

Excess nitrogen in aquatic ecosystems can be harmful. Under certain conditions (optimal pH and temperature), high ammonium levels in surface waters can be toxic to fish. High nitrate-nitrogen levels in drinking water can harm human health. High nitrate levels in drinking water can impair the blood's oxygen carrying capacity in small infants, causing "Blue Baby Syndrome." Also, when there is a sufficient supply of phosphorus available in the lake, as is usually the case in Alberta, high concentrations of nitrogen can cause an increase the growth of aquatic plants, algae, and cyanobacteria.

What Does the Law Say?

The federal *Fertilizer Act* defines what fertilizer is. It controls what can make up a fertilizer in Canada.

Alberta Environment carries out its work under the authority of the *Environmental Protection and Enhancement Act* (EPEA) and the *Water Act*. The EPEA regulates the release of substances into the environment, including releases into water. The storage and application of fertilizers is controlled under the *Environmental Protection and Enhancement Act*.

The deposit of a deleterious material of any type, including fertilizer, into water, or in a place where it may enter water frequented by fish, is contrary to the federal *Fisheries Act* [Sec. 36 (3)]. Environment Canada administers this section of the Act.

Fertilizers and Agriculture

Fertilizers used by the agriculture industry (farmers and ranchers) in Canada are controlled by the *Agricultural Chemicals Act* and the *Fertilizer Act* (Canada). The *Provincial Agricultural Operation Practices Act* (AOPA) regulates the agricultural application of phosphorous and other nutrients. This includes what kinds, how much, and where they can be applied. The AOPA also regulates the location of intensive livestock operations.

The AOPA lays out clear manure management standards for all farming and ranching operations in Alberta. In this case manure refers to livestock excreta, associated feed losses, bedding, litter, soil, and wash water. It does not include manure to which the federal *Fertilizers Act* (Section 1) applies. This section of the Act covers manure not related to agriculture.

All operators must manage and apply manure, composting materials, and compost in accordance with the nutrient management requirements in the *Provincial Standards and Administration Regulation* (Sections 23 to 25).

What Should I Do?

Short-term Solutions

Councillors should work to keep all fertilizers out of the water.

Using newsletters or public meetings, advise residents not to apply fertilizer to any property where there is a high risk of runoff. Applying fertilizer on frozen, snow-covered, saturated, or heavily compacted bare soil increases the risk of contaminated runoff reaching the water of the lake. Lawns that slope downward, towards the lake, are also very susceptible to having surface runoff from rains carry excess fertilizer directly into the water.

Advise residents to use phosphate-free detergents, they are readily available. It would also be beneficial to discourage people from washing themselves, their pets, or their vehicles in the lake. Those activities should happen on dry land, well away from the lake.

Council could encourage the establishment of volunteer lake monitoring programs. These programs can yield valuable information on the trophic status and water quality of the lake.

Long-term Solutions

Alberta's eutrophic lakes are very nutrient rich and prone to plant, alga, and cyanobacterial growth. The only real solution to decreasing the number of blooms that occur at a lake is to reduce the amount of nutrients in the lake. Certainly it is important that human activities **do not** add nutrients to the water.

Municipalities, cottagers, and farmers can adopt management strategies designed to reduce nutrient inputs to surface waters, in order to reduce the production of aquatic plants and algae with time. These strategies include the reduction of fertilizer use around lakes and the streams and rivers that flow into them, inspection of septic systems, and maintenance and restoration of riparian vegetation.

This vegetation, found along the shoreline of the lake, takes up nutrients for its own growth, keeping the nutrients out of the water where they could "feed" aquatic plants and algae. Removing shoreline vegetation removes the lakes natural filtering system and increases the chances of erosion. Erosion results in earth entering the water. This earth contains nutrients, so the problem is worsened. Bringing in sand or fill to the shoreline also adds nutrients to the water.

A Different Way of Landscaping

Encourage naturescaping within the Summer Village. The concept of naturescaping is about increasing biodiversity and preserving the balance of an ecosystem. A naturescaped yard would have no chemical inputs. For example, an alternative would be to use "grass-cycling" when mowing your lawn. Approximately half the required nitrogen for a typical growing season can be achieved simply by leaving grass clippings on the lawn. Naturescaping is all about becoming good stewards of nature, and what better place to do this than out at the lake. For more information on naturescaping see the reference in the **Are There Any Resources Available?** section of this chapter.

The Use of Bylaws

Summer Village councils can develop bylaws that:

- Ban or restrict the use of fertilizers on residential lawns.
- Ensure that all grass and plant cuttings are kept well away from the water. (Decomposing vegetation uses up oxygen in the water and also adds nutrients to the lake).

Setting a Good Example

Councillors can provide leadership and set a good example of lake stewardship by practicing environmentally friendly gardening at their own residences. Council can set an example for the Summer Village by restricting fertilizer use in municipal lands, and by encouraging the growth of shoreline vegetation in areas under their control.

Being a Good Neighbour

All the activities within a watershed affect the water quality of the lake. Summer Village council, besides working with its residents, should start a dialogue with other groups in their watershed. In particular, it would be advantageous to start working with farmers/ranchers who have property adjacent to the Summer Village. Only by all of us working together, can we really address the problem of nutrient loading at the lake.

Who Can I Contact?

For excellent information on the science of phosphorus and nitrogen, contact your local Alberta Agriculture, Food and Rural Development office.

To find out what the trophic status of your lake is, contact your regional office of Alberta Environment.

Are There Any Resources Available?

- **Managing Phosphorus to Protect Water Quality** from Alberta Agriculture at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex929](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex929)
- **Managing Nitrogen to Protect Water Quality** from Alberta Agriculture at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex928](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex928)
- **A Primer on Water Quality: Pollutant** from Alberta Agriculture at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/wat3350](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wat3350)
- For information regarding the *Agriculture Operation Practices Act* visit: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw8746](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8746)
- **NatureScape Alberta; creating and caring for wildlife habitat at home**
M. Pearman and T. Pike. 2000. Co-published by: Federation of Alberta Naturalists. Box 1472. Edmonton, AB. T5J 2N5. ISBN 0-9658765-0-8.

Seba Beach Solves a Problem and Residents Benefit

The Summer Village of Seba Beach, located on the west shore of Wabamun Lake, has a population of 137 year-round residents. During the summer months, however, the population swells to 1400. It was common practice for residents to take the grass clippings and leaves from their lawns and dispose of them in the Village drainage ditches. The result was clogged ditches, and stormwater drainage was compromised. The municipality was concerned about the potential for flooding in the Summer Village. Clippings that didn't go into the ditches went to the municipal landfill, contributing greatly to filling it. The idea of all grass clippings going into the landfill would only add to that problem.

In response to this dilemma, Council initiated a recycling/composting program. Residents can now pick up clear plastic bags, free of charge, from the Village office. They can fill these bags with grass clippings, leave them out, and Public Works employees collect them weekly. The clippings are then taken to a composting site one-kilometer outside the Village. Summer Village staff manages the compost piles. Garbage is not mixed with the clippings, and Village residents are encouraged to use the compost, free of charge, in their gardens and flower beds.

This program is now in its second year and is very popular with the residents. A plan is in the works to start collecting and recycling the plastic bags used in the composting program. The success of this program has had a significant effect on drainage improvements in the Summer Village