The role of the agronomist in nutrient management planning

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Manitoba's Nutrient Management Regulation was registered on March 18, 2008, however, did not fully come into effect until January 1, 2011. Agronomists play a role in assisting agricultural producers in nutrient management planning and ensuring their compliance with the Nutrient Management Regulation.

The purpose of the Nutrient Management Regulation is to protect water quality by:

- encouraging responsible nutrient planning;
- regulating the application of materials containing nitrogen and phosphorus;
- restricting the development of certain types of facilities in environmentally sensitive areas.

The Nitrogen and Phosphorus Problem

The gradual but steady increase in nitrogen (N) and phosphorus (P) to water systems over the past decades is the single, largest water quality challenge facing Manitoba. Scientific studies show that since the early 1970s, nitrogen and phosphorus loads to Lake Winnipeg have increased by about 10 per cent.

High levels of phosphorus and nitrogen increase the production of algae and aquatic plants. This can change aquatic habitat, reduce essential levels of dissolved oxygen, clog fisher's commercial nets, interfere with drinking water treatment facilities and cause taste and odour problems in drinking water.

Role of the Agronomist

The role of the agronomist may depend on the types of services the agronomist offers to his/her clients. The role of the agronomist may include soil testing including providing fertility recommendations, nutrient budgeting and suggesting crops that maximize nutrient update and removal. Record keeping may take a number of forms. Records may be informal if the agricultural producer is not required to register a Nutrient Management Plan or may be more formalized if required to register a Nutrient Management Plan with Manitoba Water Stewardship. The overall intent of nutrient management planning is to achieve target yields while minimizing the risk of elevating soil nutrient concentrations.

The Nutrient Management Regulation

The Nutrient Management Regulation encourages responsible nutrient planning and regulates or prohibits the land application of substances containing nitrogen or phosphorus in various Nutrient Management Zones.

Nutrient Management Zones are based on the agriculture capability (Canada Land Inventory) land classification system (Table 1). More information on agriculture capability soil classes can be accessed via Agri-Maps at the following link:
www.geoapp2.gov.mb.ca/website/mafri/index3.html

Compliance in Nutrient Management Zone N1, N2 and N3 can be achieved by not exceeding the soil nitrate-nitrogen limits and P_2O_5 application rates listed in Table 1.

Table 1. Nutrient Management ZoneSoil Nitrate-N Limits and P Thresholds

Nutrient Management Zone and Agriculture Capability		Residual† soil nitrate-nitrogen limits within the top 60 cm (24 inches) of soil
Zone	**Soil Class**	**kg/ha (lb/ac)**
N1	class 1, 2 and 3 except any 3M* subclass	157.1 (140)
N2	any 3 M* subclass, class 4 and 5M* subclass if it is being irrigated	101 (90)
N3	class 5 except 5M§ under irrigation	33.6 (30)
N4	class 6, 7 and unimproved organic	no nitrogen applications
NBZ	not applicable	no nitrogen applications

Nutrient Management Zone	Soil phosphorus (P) thresholds within the top 15 cm (6 inches) of soil (Olsen P)	Allowable application rate of P expressed as P_2O_5
Zone	**Parts per million (ppm)**	**kg/ha (lb/ac)**
N1	<60	no restriction
N2	between 60 and <120	two times the crop removal rate **
and N3	between 120 and <180	one times the crop removal rate **
N3	180 and more	no application without approval by the director
N4	no phosphorus applications	
NBZ	no phosphorus applications	

* A "3M" subclass includes soil classes 3M, 3ME, 3MI, 3MN, 3MP, 3MT, 3 MW and any other subclass of soil class 3 having an "M" subclass designation.

§ A "5M' subclass includes soil classes 5M, 5 ME, 5MP, 5MT or 5RM and any other subclass of soil class 5 having a "M" subclass designation.

NBZ Nutrient Buffer Zone (Table 2).

** May apply manure at up to five times the annual crop removal rate provided the next application does not occur until the equivalent number of application years have passed or soil test phosphorus levels at any place in the field do not exceed the soil test values prior to the manure application. However, the annual nitrate nitrogen limits must not be exceeded.

† At the end of the growing season after the production of a crop.

Nutrient Management Zone N4

Nutrient Management Zone N4 (CLI class 6 and 7 lands and unimproved organic soils) is considered environmentally sensitive. The majority of these lands are not presently cropped. Nutrient Management Zone N4 consists of landscapes with steep slopes, stable and active sand dunes, salt flats, marshes, bogs and fens.

Existing operations that apply nutrients to land in Nutrient Management Zone N4 must register a Nutrient Management Plan with Manitoba Water Stewardship. Livestock grazing is permitted within Nutrient Management Zone N4.

Nutrient Management Plans

Agriculture operations may be required to register a Nutrient Management Plan. Nutrient Management Plans are used to demonstrate that nitrogen and phosphorus are not being applied in excess of the reasonable nutritive needs of growing plants. Proper nutrient management planning reduces the risk of over-application of nutrients to land and potential loss to surface or groundwater.

Nutrient Management Plans should account for all sources of nutrients that will be stored or handled on the land or applied to it, including livestock manure, synthetic fertilizer, municipal wastewater sludge and biosolids.

When to register a Nutrient Management Plan
Effective, January 1, 2011, the Nutrient Management Regulation requires certain agricultural producers to register a Nutrient Management Plan with Manitoba Water Stewardship if:

- nutrients will be applied to any field that exceeds the residual soil nitrate-nitrogen limits specified for the appropriate Nutrient Management Zone (Table 1); or
- nutrients will be applied to any field resulting in soil test phosphorus measuring 60 ppm or more within the Nutrient Management Zone and the maximum allowable phosphorus application rate is not able to be met (Table 1).

Parcels of land included in a Manure Management Plan submitted to Manitoba Conservation do not need to be included in a Nutrient Management Plan submitted to Manitoba Water Stewardship.

Nutrient Management Plan Templates
Nutrient Management Plan templates are available for:

- livestock manure or livestock operations with less than 300 animal units;
- synthetic fertilizer;
- municipal wastewater sludge or biosolids.

Nutrient Management Plan templates can be found at:
www.manitoba.ca/waterstewardship/wqmz/index.html

Deadlines
Nutrient Management Plans are to be submitted to Manitoba Water Stewardship in accordance with the following dates:

- prior to February 10 for spring fertilization programs;
- prior to July 10 for fall fertilization programs; or
- not less than 14 days prior to land application.

Landowners or tenants may prepare a Nutrient Management Plan for their own lands. If a Nutrient Management Plan is prepared by a third party, the third party must have training or experience in nutrient management. In addition, the third party must be either a member of the Manitoba Institute of Agrologists or hold the designation of Certified Crop Adviser offered by the American Society of Agronomy.

Winter Application of Nutrients
Synthetic fertilizers, municipal wastewater sludges or biosolids containing nitrogen or phosphorus cannot be applied to land between November 10 of one year and April 10 of the following year. The intent of this clause is to ensure that nutrients are not applied to frozen soils. The winter application of nutrients restrictions contained within the Nutrient Management Regulation does not apply to the application of livestock manure.

The Nutrient Management Regulation allows the Director to vary the dates to a date later than November 10th or a date earlier than April 10th.

Nutrient Buffer Zones

Nutrient Buffer Zones apply to all water bodies and groundwater features located across Manitoba. Nutrients containing nitrogen or phosphorus cannot be applied to areas within the Nutrient Buffer Zone. The width of the Nutrient Buffer Zone varies depending on the nature of the body of water (see Tables 2 and 3). Agronomists have a role in ensuring that Nutrient Buffer Zone setbacks are respected.

Agronomists are part of the Solution

Agronomists can assist agricultural producers through routine soil testing and nutrient management planning by providing fertility recommendations so that target yields can be achieved while minimizing the risk of elevating soil nutrient concentrations. In the event that soil nutrient concentrations are elevated, agronomists are able to prepare Nutrient Management Plans on behalf of a landowner.

Table 2. Width of Nutrient Buffer Zones*

Water Body	Setback if applicable area is covered with permanent vegetation	Setback if applicable area is not covered with permanent vegetation
• a roadside ditch or an Order 1 or 2 drain†	No direct application to ditches and Order 1 and 2 drains	
• a groundwater feature	15 m (49 feet)	20 m (66 feet)
• a wetland, bog, marsh or swamp other than a major wetland, bog, marsh or swamp‡	Distance between the water's edge and the high water mark	
• a lake or reservoir designated as vulnerable**	30 m (98 feet)	35 m (115 feet)
• a lake or reservoir (not including a constructed storm water retention pond) not designated as vulnerable** • a river, creek or stream designated as vulnerable**	15 m (49 feet)	20 m (66 feet)
• a river, creek or stream not designated as vulnerable** • an Order 3 or higher drain† • a major wetland, bog, marsh or swamp‡ • a constructed storm water retention pond	3 m (10 feet)	8 m (26 feet)

* Nutrient Buffer Zone is measured from the water body's high water mark or the top of the outermost bank on that side of the water body, whichever is further from the water. The application of nitrogen or phosphorus is prohibited within the Nutrient Buffer Zone.

† Designated on a Manitoba Water Stewardship plan that shows the designation of drains. Information on drain order maps may be accessed via Agri-Maps at the following link: **http://geoapp2.gov.mb.ca/website/mafri/index3.html**

‡ As defined in Section 1(2) in the Nutrient Management Regulation under *The Water Protection Act*.
For the purposes of this regulation, a wetland, bog, marsh or swamp is major if it:

- has an area greater than two hectares (4.94 acres);
- is connected to one or more downstream water bodies or groundwater features;
- contains standing water or saturated soils for periods of time sufficient to support the development of hydrophytic vegetation.

** Designated as vulnerable if listed in the Schedule in the Nutrient Management Regulation under *The Water Protection Act* (Table 3).

Table 3. Vulnerable Water Bodies

Rivers, Creeks and Streams	Lakes and Reservoirs	
1. Assiniboine River	19. Boissevain Reservoir	40. Lake Winnipeg
2. Berens River	20. Bowden Lake	41. Lake Winnipegosis
3. Birch River	21. Brereton Lake	42. Landing Lake
4. Boyne River	22. Caddy Lake	43. Mary-Jane Reservoir
5. Burntwood River	23. Cliff Lake	44. Moose Nose Lake
6. Churchill River	24. Cross Lake	45. Nutimik Lake
7. La Salle River	25. Deloraine Reservoir	46. Paint Lake
8. Lee River	26. Footprint Lake	47. Reindeer Lake
9. Manigotogan River	27. God's Lake	48. Rice Lake
10. Nelson River	28. Goudney Reservoir	49. Sherlett Lake
11. Pikewitonei River	29. Granville Lake	50. Shoal Lake (located at approximate latitude 49° 37' N, longitude 95° 11' W)
12. Pinawa Channel	30. Hunt Lake	
13. Red River	31. Island Lake	
14. Saskatchewan River	32. Killarney Lake	51. Snow Lake
15. Squirrel Creek	33. Kississing Lake	52. Stephenfield Reservoir
16. Valley River	34. Lac du Bonnet	53. Wekusko Lake
17. Waterhen River	35. Lake Athapapuskow	54. Wellman Lake
18. Winnipeg River	36. Lake Irwin	55. West Lynn Lake
	37. Lake Manitoba	56. White Lake
	38. Lake Minnewasta	57. William Lake
	39. Lake Wahtopanah	