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## CROP NUTRIENT BALANCE SHIFT IN THE LAKE ERIE WATERSHED

**The economics of farming are changing dramatically.** The balance between the nutrients applied to and removed by crops in the region surrounding Lake Erie is shifting.

**Nutrient balance is an important indicator of sustainability.** It gauges whether nutrients are accumulating in the soil, or being depleted. Coupled with indicators of soil fertility status, it can show whether a production system is being managed in a way to sustain profitable crops and fertile soils while minimizing losses of nutrients that might contaminate water and air.

**Several trends are changing the balance.** The past 3 years have seen big swings in prices for crop commodities and fertilizers, reducing the rates of fertilizer applied, particularly for P and K. In response to competitive end-uses for feedgrains, the livestock industry has shrunk. For the livestock that remain, new livestock feeding practices and technologies are reducing the amount of N and P in manure. Thus, both the amount of manure for land application and its nutrient content have declined considerably. In the meantime, crops have continued their upward trend in yields, removing more nutrients with harvest.

**The combination of all these trends has moved the nutrient balance from surplus to deficit.** Over the past 10 years, the P balance in the agricultural areas of Ontario, Michigan, and Ohio shifted from a surplus of 4% over crop removal to a deficit of 12% below the amount removed by crops.

**Is this cause for alarm?** We need to consider a few other facts. First, the history of the agricultural nutrient balance. If we go back a few decades, prior to 1990, we find P was being applied in surplus. Where there was surplus nutrient application, soil P levels were building up. In soils that were deficient, it was a good thing. Increasing the fertility of nutrient-poor soils is a fundamental first step for increasing their productivity and supporting high crop yields. But other soils were built up to levels beyond the needs of the crops. On those soils, the transition to a deficit balance may not be a problem for a number of years. The large shift in the regional nutrient balance, however, underscores how important it is that producers pay attention to the nutrient balances and soil fertility status at the level of their individual fields and farms.

**A declining surplus doesn't mean all the environmental problems have disappeared.** Water quality issues arising from P losses remain. Reducing nutrient losses from crop production requires attention to more than just the amounts applied. The P applied in the past remains in the soil, a benefit to the nutrition of crops, but a risk factor for areas from which water runs off or leaches. Managing the risk of water contamination involves careful attention to site-specific nutrient balances, placement and timing of nutrient applications, and appropriate management of crop residues and buffer areas next to watercourses.

**A commitment to 4R Nutrient Stewardship brings people together for sustainable solutions.** At a Great Lakes Phosphorus Forum held recently in Windsor, Ontario, people involved in various sectors of agri-business and environmental protection visited farms and fertilizer dealers—discovering the site-specific reasons for their choices of sources, rates, timing and placement practices—while discussing trends in P loading into Lake Erie and its water quality. Collaborative efforts that build mutual understanding are essential for progress toward more sustainable production.

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Abbreviations: N = nitrogen; P = phosphorus; K = potassium.