



## *Phosphorus Management is Important to Protect the Saginaw Bay*

*Proper management of phosphorus involves multiple factors including conservation tillage, cover crops, filter strips and the "4R's" of nutrient stewardship.*

Recently a lot of attention has been focused on the Western Lake Erie Basin when more than 400,000 Toledo residents lost use of safe water due to toxins from a harmful algal bloom. Algal blooms are in part fueled by increased phosphorus levels in the water. This may come from a variety of sources including: waste/storm water, septic systems and agriculture. In the 70's and 80's major effort was put forth to clean up P point source pollution and sediment/particulate runoff from agriculture. These efforts have been successful in reducing P levels from these sources.

More recently attention has been focused on **dissolved reactive P (DRP)**. This is the portion of P that is in solution with water. To the algae, this solution can be 100% available while particulate (dirty water/soil) P is estimated to be 25% available. In the Lake Erie Basin, widespread implementation of no-till and other conservation practices has greatly reduced sedimentation from agriculture reaching the waterways. However concern now exist that this system has now created more DRP, particularly coming through the tile lines. It is estimated that tile lines can be responsible for up to 50% of the DRP.

In the Lake Erie Basin, several factors together have played a role in the increase of DRP in tile water. There has been a significant increase in acreage and intensity of tile drainage in recent years. Broadcast P in no-till production system has caused a stratification of P concentrating in the upper two inches of soil. Long term no-till systems have increased macro-pores created from worms and decayed roots. This allows for faster water infiltration and a more direct conduit of DRP to the tile lines. This is particularly a problem during high intensity rainfalls. With implications to agriculture, new regulations and P reduction strategies are being created.

The Saginaw Bay has not had problems at the magnitude of the Western Lake Erie Basin. However it is not without issues as shown by NOAA satellite images taken in 2011 of an algal bloom along with reoccurring muck on the beaches. The Saginaw Bay has not met the target on **Total Phosphorus (TP)** load set by the Great Lakes Water Quality Agreement. It has been designated as an Area of Concern by the International Joint Commission. The **Saginaw Bay Watershed (SBW)** geography is similar to the the Western Lake Erie Basin. It involves several major metropolitan areas, has a major river going to Lake Huron and involves millions of acres of well tiled agricultural cropland and livestock operations.

These fields are inter twined by several thousand miles of drainage ditches that all flow to the Saginaw Bay. In Saginaw County alone over 1800 miles of surface drains exist. Even a small amount of P escaping from every acre in total can add up to a significant number. Producers must be vigilant in preventing P from leaving farms or risk increased regulation.

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In the last 35 years in the SBW, major progress has been made in agriculture in reducing P fertilizer rates and minimizing run-off. Michigan State University Extension and other government agencies have been involved. A good example is sugarbeets, it was common for growers to apply 60-70 lbs/acre of P<sub>2</sub>O<sub>5</sub>. Today the average rate would be closer to 15-25 lbs/acre which is less than crop removal. In the state of Michigan the most recent survey of soil test P levels conducted in 2010 indicated a downward trend. In the SBW many growers are only banding starter P at planting in an efficient 2 by 2 application or in furrow. Most fields now are grid sampled for nutrients and lime which are applied site specifically. Producers have embraced the 4R's of nutrient stewardship-the right fertilizer source at the right rate, at the right time and in the right place.

Tillage systems have also change dramatically. Almost all growers are using some form of conservation tillage which will keep residue on the surface and help prevent run-off. Because of the crop diversity (sugarbeets, pickles, and dry beans) producers in the Saginaw Bay area are generally not in a strict no-till system. In one way this may be beneficial by not allowing the large capillaries to form a direct conduit to the tile lines.

In the last few years there has been a steady increase of the use of cover crops in rotation. Most of this has stemmed from the soil health aspect particularly from cereals and clovers. Others cover crops such as oil seed radish have been utilized as a nematode trap crop in sugarbeets. In either case the use of cover crops reduces the off farm movement of phosphorus by soil movement and helps trap it before it gets to the tile. Increased use of cover crops will have multiple benefits in agriculture and the Saginaw Bay. Filter strips next to ditches have also played an important role in minimizing particulate P run off. Additionally large livestock operations are required to have a nutrient management plan for handling of manure.

Farming in the heart of one of the world's largest fresh water reserves must not be taken lightly. Special management and practices will need to be continually implemented to minimize P leaving agriculture land. Let there be no misunderstanding producers will come under more scrutiny in the future when it comes to nutrient management, particularly with phosphorus. Small management changes implemented on more than one million acres surrounding the Saginaw Bay can have a large total impact. Small management changes over time, will be less painful than large changes in the future mandated by regulations.

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