

Ohio

Assessing Phosphorus Buildup in Crop Acreage— The Upper Vermilion Watershed Project

By B.W. Ward

Much has been said in recent years about the sediment and phosphorus (P) loading of our nation's rivers and lakes from the practices of agricultural producers in raising crops. The term, 'nonpoint source pollution', has been used extensively in describing agricultural (among other) contributions to water quality problems. Results of the project reported in this article emphasize the importance of gathering data before drawing conclusions.

NUTRIENTS moving off of a particular field site in the form of nonpoint source pollution will impact streams that receive them. The major effect is most often noticed once nutrients reach the stagnant part of a stream, lake or pond. Phosphorus does a good job of growing plants both on land and in water.

Phosphorus closely adheres to soil particles. Therefore, keeping soil in its place will eliminate many of the concerns of P loading of streams and rivers. Best management practices (BMPs) that are used to stabilize soil, along with maintaining optimum levels of soil P, will minimize the problem of P loading.

One of the objectives of the Upper Vermilion Watershed Project (UVWP) was to gather data from this watershed which was suspected of having an excess P buildup in cropped soils. The Ohio Environmental Protection Agency (OEPA) identified this watershed as ranking ninth out of 285 basins in agricultural P contributions to Lake Erie in the 1985 *State of Ohio Phos-*

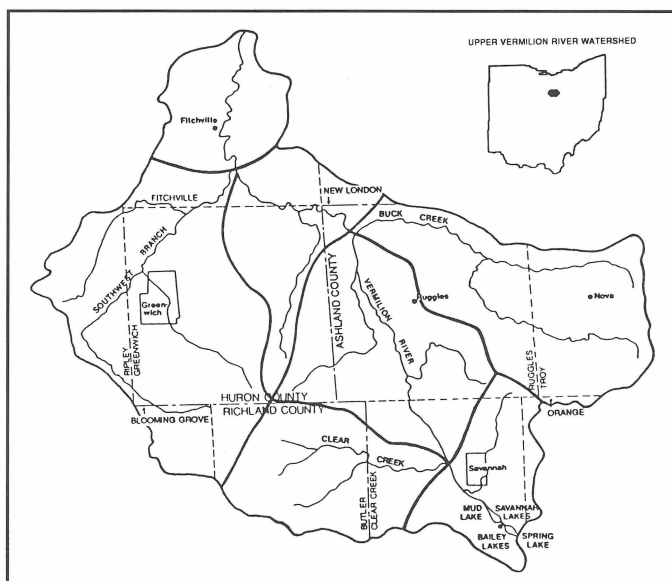


Figure 1. Upper Vermilion River Watershed.

(Source: Ohio EPA)

phorus Strategy for Lake Erie, Figure 1.

The project goal was to improve water quality of the Upper Vermilion Watershed by improving nutrient management by farmers. Two of the project objectives were as follows: 1) maintain complete records and submit timely reports of data collected and efforts spent on the program; and 2) utilize information gathered in the program to educate the public about nutrient management concerns and achievements.

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Table 1. Summary of results from 987 soil samples, representing 15,431 acres in the Upper Vermilion River Watershed.

Soil test	High	Low	Average	Weighted average
pH	7.7	3.1	6.3	—
Phosphorus, lb/A	418	4	64	65
Potassium, lb/A	984	63	240	243
Calcium, lb/A	7,649	368	2,854	2,920
Magnesium, lb/A	1,148	87	458	460

Table 2. Soil test classifications and recommended corrective practices.

Soil test P, lb/A	Classification	Recommended corrective action
0 - 30	Deficient	Apply buildup amounts of P_2O_5
31 - 60	Ideal	Apply P_2O_5 rates equal to crop removal
61 - 250	High	No fertilizer P_2O_5 above 90 for corn (100 for soybeans); manure may be applied
251 - 300	Pollution hazard	No P_2O_5 recommended
301 +	High pollution hazard	No P_2O_5 recommended

Source: Ohio Livestock and Wastewater Management Guide

Soil Test Important

Soil loaded with P was one of the major issues this project addressed to see if it was indeed a buildup problem, and in turn, a pollution problem. Soil testing was an important part of UVWP. The project initially focused on livestock operations, as they typically have fields with high P levels due to applications of both manure and commercial fertilizers. Later in the project, row crop farmers were also included in the database. This was done to assure that project results would be representative of the Upper Vermilion as a whole.

A total of 987 soil samples were collected, tested and stored in the database, **Table 1**. **Table 2** lists the various soil test classifications and recommended corrective procedures used in the UVWP. **Figure 2** shows the range of P soil test levels in the UVWP.

The "weighted average" (per acre) P level for the Upper Vermilion Watershed was 65 lb/A. Highest soil test was 418 lb/A; the low was 4 lb/A. Forty-one percent of the soils tested in the 31 to 60 lb/A range, considered to be ideal for crop production. Another 19 percent tested in the 0 to 30 lb/A range, while 23 percent tested from 61 to 90 lb/A, 13 percent 91 to 150, 3 percent 151 to 250, and only 1 percent tested above 250 lb/A.

No doubt there is work to be done . . . to increase P levels on some fields and reduce them in others. **However, up to 99 percent of the soils in the Upper Vermilion are not considered pollution hazards.** Almost half (41 percent) of the soils test in the ideal range.

Results from UVWP show that acreage utilized growing 'traditional' crops in Ohio (such as corn and soybeans) is actually lower in P than what was originally assessed. It gives us a clearer picture of the safety of our crop nutrient application methods. ■

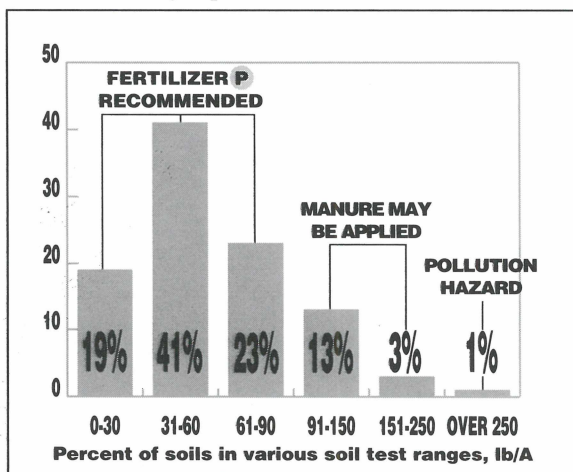


Figure 2. Phosphorus soil test levels in the Upper Vermilion River Watershed, Ohio.